

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
8 March 2001 (08.03.2001)

PCT

(10) International Publication Number
WO 01/16312 A2(51) International Patent Classification: C12N 15/11,
9/00, C07H 21/00, 19/00, C12P 19/34, A61K 31/0888,
C12N 5/10 // A61P 3/10, 9/00, 25/28, 35/00

(21) International Application Number: PCT/US00/23998

(22) International Filing Date: 30 August 2000 (30.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/151,713	31 August 1999 (31.08.1999)	US
09/406,643	27 September 1999 (27.09.1999)	US
60/156,467	27 September 1999 (27.09.1999)	US
60/156,236	27 September 1999 (27.09.1999)	US
09/436,430	8 November 1999 (08.11.1999)	US
60/169,100	6 December 1999 (06.12.1999)	US
60/173,612	29 December 1999 (29.12.1999)	US
09/474,432	29 December 1999 (29.12.1999)	US
09/476,387	30 December 1999 (30.12.1999)	US
09/498,824	4 February 2000 (04.02.2000)	US
09/531,025	20 March 2000 (20.03.2000)	US
60/197,769	14 April 2000 (14.04.2000)	US
09/578,223	23 May 2000 (23.05.2000)	US
Not furnished	9 August 2000 (09.08.2000)	US

(71) Applicant (for all designated States except US): RI-
BOZYME PHARMACEUTICALS, INC. [US/US];
2950 Wilderness Place, Boulder, CO 80301 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): MCSWIGGEN,
James [US/US]; 4866 Franklin Drive, Boulder, CO 80301
(US). USMAN, Nassim [CA/US]; 2129 Night Sky Lane,
Lafayette, CO 80026 (US). BLATT, Lawrence [US/US];
2176 Riverside Lane, Boulder, CO 80304 (US). BEIGEL-
MAN, Leonid [US/US]; 5530 Colt Drive, Longmont,
CO 80503 (US). BURGIN, Alex [US/US]; 832 Camino
Estrella, Chula Vista, CA 91910 (US). KARPEISKY,

Alexander [RU/US]; 420 Vernier Avenue, Lafayette,
CO 80026 (US). MATULIC-ADAMIC, Jasenka
[HR/US]; 760 South 42nd Street, Boulder, CO 80303
(US). SWEEDLER, David [US/US]; 956 St. Andrews
Lane, Louisville, CO 80027 (US). DRAPER, Kenneth
[US/US]; 4791 Cougar Creek Trail, Reno, NV 89509
(US). CHOWRIRA, Bharat [IN/US]; 1138 Clubhouse
Drive, Broomfield, CO 80020 (US). STINCHCOMB,
Dan [US/US]; 8409 South Country Road 3, Fort Collins,
CO 80528 (US). BEAUDRY, Amber [US/US]; 13068
Westlake Place, Broomfield, CO 80026 (US). ZINNEN,
Shawn [US/US]; 2378 Birch Street, Denver, CO 80207
(US). LUGWIG, Janos [DE/DE]; Untere Karspule 13B,
D-37073 Gottingen (DE). SPROAT, Brian, S. [GB/DE];
Am Antonsberg 10, D-37139 Adelebsen (DE).

(74) Agents: PRINCE, Robert, W. et al.; Brobeck, Phleger &
Harrison, 12390 El Camino Real, San Diego, CA 92130
(US).(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, GR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.(84) Designated States (regional): ARIPO patent (GI, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— Without international search report and to be republished
upon receipt of that reportFor two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: NUCLEIC ACID BASED MODULATORS OF GENE EXPRESSION

(57) Abstract: Novel nucleic acid molecules useful as inhibitors of gene expression, compositions, and methods for their use.



WO 01/16312 A2

NUCLEIC ACID BASED MODULATORS OF GENE EXPRESSION

Background of the Invention

This invention relates to reagents useful as inhibitors of gene expression relating to diseases such as cancers, diabetes, obesity, Alzheimer's disease, cardiac diseases, age-related diseases, and/or hepatitis B infections and related conditions.

Summary of the Invention

The invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (for example, Cook et al., U.S. Patent 5,359,051)] and methods for their use to modulate the expression of molecular targets impacting the development and progression of cancers, diabetes, obesity, Alzheimer's disease, cardiac diseases, age-related diseases, and/or hepatitis B infections and related conditions

In a preferred embodiment, the invention features novel nucleic acid-based techniques [e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups (for exaple, Cook et al., U.S. Patent 5,359,051)] and methods for their use for inhibiting the expression of disease related genes, e.g., Protein-Tyrosine-Phosphatase-1b (PTP-1B, Genbank accession No. NM_002827), Methionine Aminopeptidase (MetAP-2, Genbank accession No. U29607), beta-Secretase (BACE, Genbank accession No. AF190725), Presenilin-1 (ps-1, Genbank accession No. L76517), Presenilin-2 (ps-2, Genbank accession No. L43964), Human Epidermal Growth Factor Receptor-2 (HER2/c-erb2/neu, Genbank accession No. X03363), Phospholamban (PLN, Genbank accession No. NM_002667), Telomerase (TERT, Genbank accession No. NM_003219) and Hepatitis B virus genes (HBV, Genbank accession No. AF100308.1). Such ribozymes can be used in a method for treatment of diseases caused by the expression of these genes in man and other animals, including other primates.

Thus, in an additional preferred embodiment, the invention features novel nucleic acid-based techniques such as enzymatic nucleic acid molecules and antisense molecules and methods for their use to down regulate or inhibit the expression of genes encoding Protein-Tyrosine-Phosphatase-1b (PTP-1B), Methionine Aminopeptidase (MetAP-2),

beta-Secretase (BACE), Presenilin-1 (ps-1), Presenilin-2 (ps-2), Human Epidermal Growth Factor Receptor-2 (HER2/c-erb2/neu), Phospholamban (PLN), Telomerase (hTERT) PKC alpha. and Hepatitis B (HBV) proteins. In particular, applicant describes the selection and function of nucleic acid molecules capable of cleaving RNAs encoded by these genes and their use to reduce levels of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV proteins in various tissues to treat the diseases discussed herein. Such nucleic acid molecules are also useful for diagnostic uses.

In a preferred embodiment, the invention features the use of one or more of the nucleic acid-based techniques independently or in combination to inhibit the expression of the genes encoding PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV. Specifically, the invention features the use of nucleic acid-based techniques to specifically inhibit the expression of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, PKC alpha, and/or HBV genes.

In yet another preferred embodiment, the invention features the use of an enzymatic nucleic acid molecule, preferably in the hammerhead, NCH (Inozyme), G-cleaver, amberzyme, zinzyme, and/or DNAzyme motif, to inhibit the expression of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, PKC alpha and/or HBV RNA.

Applicant indicates that these nucleic acid molecules are able to inhibit expression of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, PKC alpha, and/or HBV genes. Those of ordinary skill in the art, will find that it is clear from the examples described that other nucleic acid molecules that inhibit target PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV encoding mRNAs may be readily designed and are within the scope of the invention.

By "inhibit" it is meant that the activity of target genes or level of mRNAs or equivalent RNAs encoding target genes is reduced below that observed in the absence of the nucleic acid molecules of the instant invention (*e.g.*, enzymatic nucleic acid molecules), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups). In one embodiment, inhibition with an enzymatic nucleic acid molecule preferably is below that level observed in the presence of an enzymatically attenuated nucleic acid molecule that is able to bind to the same site on the mRNA, but is unable to cleave that RNA. In another embodiment, inhibition with nucleic acid molecules, including enzymatic nucleic acid and antisense

molecules, is preferably greater than that observed in the presence of, for example, an oligonucleotide with scrambled sequence or with mismatches. In another embodiment, inhibition of target genes with the nucleic acid molecule of the instant invention is greater than in the presence of the nucleic acid molecule than in its absence. According to the invention, the activity of telomerase enzyme or the level of RNA encoding one or more protein subunits of the telomerase enzyme is inhibited if it is at least 10% less, 20% less, 50% less, 75% less or even not active or present at all, in the presence of a nucleic acid of the invention relative to the level in the absence of such a nucleic acid.

By "enzymatic nucleic acid molecule" it is meant a nucleic acid molecule which has complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity which is active to specifically cleave target RNA. That is, the enzymatic nucleic acid molecule is able to intermolecularly cleave RNA and thereby inactivate a target RNA molecule. These complementary regions allow sufficient hybridization of the enzymatic nucleic acid molecule to the target RNA and thus permit cleavage. One hundred percent complementarity is preferred, but complementarity as low as 50-75% may also be useful in this invention. The nucleic acids may be modified at the base, sugar, and/or phosphate groups. The term enzymatic nucleic acid is used interchangeably with phrases such as ribozymes, catalytic RNA, enzymatic RNA, catalytic DNA, aptazyme or aptamer-binding ribozyme, regulatable ribozyme, catalytic oligonucleotides, nucleozyme, DNazyme, RNA enzyme, endoribonuclease, endonuclease, minizyme, leadzyme, oligozyme or DNA enzyme. All of these terminologies describe nucleic acid molecules with enzymatic activity. The specific enzymatic nucleic acid molecules described in the instant application are not meant to be limiting and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it have a specific substrate binding site which is complementary to one or more of the target nucleic acid regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart a nucleic acid cleaving activity to the molecule (Cech et al., U.S. Patent No. 4,987,071; Cech et al., 1988, JAMA 260:20 3030-4).

By "nucleic acid molecule" as used herein is meant a molecule having nucleotides. The nucleic acid can be single, double, or multiple stranded and may comprise modified or unmodified nucleotides or non-nucleotides or various mixtures and combinations thereof.

An example of a nucleic acid molecule according to the invention is a gene which encodes for a macromolecule such as a protein.

By "enzymatic portion" or "catalytic domain" is meant that portion/region of the enzymatic nucleic acid molecule essential for cleavage of a nucleic acid substrate (for

5 example see **Figures 1-5**).

By "substrate binding arm" or "substrate binding domain" is meant that portion/region of a ribozyme which is complementary to (*i.e.*, able to base-pair with) a portion of its substrate. Generally, such complementarity is 100%, but can be less if desired. For example, as few as 10 bases out of 14 may be base-paired. Such arms are shown generally in **Figures 1-5**. That is, these arms contain sequences within a ribozyme which are intended to bring ribozyme and target RNA together through complementary base-pairing interactions. The ribozyme of the invention may have binding arms that are contiguous or non-contiguous and may be of varying lengths. The length of the binding arm(s) are preferably greater than or equal to four nucleotides and of sufficient length to stably interact with the target RNA; specifically 12-100 nucleotides; more specifically 14-24 nucleotides long. If two binding arms are chosen, the design is such that the length of the binding arms are symmetrical (*i.e.*, each of the binding arms is of the same length; *e.g.*, five and five nucleotides, six and six nucleotides or seven and seven nucleotides long) or asymmetrical (*i.e.*, the binding arms are of different length; *e.g.*, six and three nucleotides; three and six nucleotides long; four and five nucleotides long; four and six nucleotides long; four and seven nucleotides long; and the like). Binding arms can be complementary to the specified substrate, to a portion of the indicated substrate, to the indicated substrate sequence and additional adjacent sequence, or a portion of the indicated sequence and additional adjacent sequence.

25 By "NCH" or "Inozyme" motif is meant, an enzymatic nucleic acid molecule comprising a motif as described in Ludwig *et al.*, USSN No. 09/406,643, filed September 27, 1999, entitled "COMPOSITIONS HAVING RNA CLEAVING ACTIVITY", and International PCT publication Nos. WO 98/58058 and WO 98/58057, all incorporated by reference herein in their entirety, including the drawings.

30 By "G-cleaver" motif is meant, an enzymatic nucleic acid molecule comprising a motif as described in Eckstein *et al.*, International PCT publication No. WO 99/16871, incorporated by reference herein in its entirety, including the drawings.

By "zinzyme" motif is meant, a class II enzymatic nucleic acid molecule comprising a motif as described herein and in Beigelman *et al.*, International PCT publication No. WO 99/55857, incorporated by reference herein in its entirety, including the drawings.

- 5 By "amberzyme" motif is meant, a class I enzymatic nucleic acid molecule comprising a motif as described herein and in Beigelman *et al.*, International PCT publication No. WO 99/55857, incorporated by reference herein in its entirety, including the drawings.

- 10 By 'DNAzyme' is meant, an enzymatic nucleic acid molecule lacking a ribonucleotide (2'-OH) group. In particular embodiments, the enzymatic nucleic acid molecule may have an attached linker(s) or other attached or associated groups, moieties, or chains containing one or more nucleotides with 2'-OH groups. A DNAzyme can be synthesized chemically or can be expressed by means of a single stranded DNA vector or equivalent thereof.

- 15 By "sufficient length" is meant an oligonucleotide of greater than or equal to 3 nucleotides that is of a length great enough to provide the intended function under the expected condition. For example, for binding arms of enzymatic nucleic acid "sufficient length" means that the binding arm sequence is long enough to provide stable binding to a target site under the expected binding conditions. Preferably, the binding arms are not so long as to prevent useful turnover.

- 20 By "stably interact" is meant, interaction of the oligonucleotides with target nucleic acid (*e.g.*, by forming hydrogen bonds with complementary nucleotides in the target under physiological conditions).

- By "equivalent" RNA to PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV is meant to include those naturally occurring RNA molecules having
25 homology (partial or complete) to PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV proteins or encoding for proteins with similar function as PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV in various organisms, including human, rodent, primate, rabbit, pig, protozoans, fungi, plants, and other microorganisms and parasites. The equivalent RNA sequence also includes in addition to
30 the coding region, regions such as 5'-untranslated region, 3'-untranslated region, introns, intron-exon junction and the like in HBV.

By "homology" is meant the nucleotide sequence of two or more nucleic acid molecules is partially or completely identical.

By "antisense nucleic acid", it is meant a non-enzymatic nucleic acid molecule that binds to target RNA by means of RNA-RNA or RNA-DNA or RNA-PNA (protein nucleic acid; Egholm *et al.*, 1993 *Nature* 365, 566) interactions and alters the activity of the target RNA (for a review, see Stein and Cheng, 1993 *Science* 261, 1004 and Woolf *et al.*, US patent No. 5,849,902). Typically, antisense molecules will be complementary to a target sequence along a single contiguous sequence of the antisense molecule. However, in certain embodiments, an antisense molecule may bind to substrate such that the substrate molecule forms a loop, and/or an antisense molecule may bind such that the antisense molecule forms a loop. Thus, the antisense molecule may be complementary to two (or even more) non-contiguous substrate sequences or two (or even more) non-contiguous sequence portions of an antisense molecule may be complementary to a target sequence or both. For a review of current antisense strategies, see Schmajuk *et al.*, 1999, *J. Biol. Chem.*, 274, 21783-21789, Delihias *et al.*, 1997, *Nature*, 15, 751-753, Stein *et al.*, 1997, *Antisense N. A. Drug Dev.*, 7, 151, Crooke, 1998, *Biotech. Genet. Eng. Rev.*, 15, 121-157, Crooke, 1997, *Ad. Pharmacol.*, 40, 1-49. In addition, antisense DNA can be used to target RNA by means of DNA-RNA interactions, thereby activating RNase H, which digests the target RNA in the duplex. Antisense DNA can be synthesized chemically or can be expressed via the use of a single stranded DNA expression vector or the equivalent thereof.

By "2-5A antisense chimera" it is meant, an antisense oligonucleotide containing a 5'-phosphorylated 2'-5'-linked adenylate residue. These chimeras bind to target RNA in a sequence-specific manner and activate a cellular 2-5A-dependent ribonuclease which, in turn, cleaves the target RNA (Torrence *et al.*, 1993 *Proc. Natl. Acad. Sci. USA* 90, 1300).

By "triplex DNA" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin *et al.*, 1992, *Proc. Natl. Acad. Sci. USA*, 89, 504).

By "gene" it is meant a nucleic acid that encodes a RNA.

By "complementarity" is meant that a nucleic acid can form hydrogen bond(s) with another RNA sequence by either traditional Watson-Crick or other non-traditional types. In reference to the nucleic molecules of the present invention, the binding free energy for a nucleic acid molecule with its target or complementary sequence is sufficient to allow the relevant function of the nucleic acid to proceed, e.g., ribozyme cleavage, antisense or triple helix inhibition. Determination of binding free energies for nucleic acid molecules is well known in the art (see, e.g., Turner et al., 1987, *CSH Symp. Quant. Biol.* LII pp.123-133; Frier et al., 1986, *Proc. Nat. Acad. Sci. USA* 83:9373-9377; Turner et al., 1987, *J. Am. Chem. Soc.* 109:3783-3785). A percent complementarity indicates the percentage of contiguous residues in a nucleic acid molecule which can form hydrogen bonds (e.g., Watson-Crick base pairing) with a second nucleic acid sequence (e.g., 5, 6, 7, 8, 9, 10 out of 10 being 50%, 60%, 70%, 80%, 90%, and 100% complementary). "Perfectly complementary" means that all the contiguous residues of a nucleic acid sequence will hydrogen bond with the same number of contiguous residues in a second nucleic acid sequence.

At least seven basic varieties of naturally-occurring enzymatic RNAs are known presently. Each can catalyze the hydrolysis of RNA phosphodiester bonds in *trans* (and thus can cleave other RNA molecules) under physiological conditions. **Table I** summarizes some of the characteristics of these ribozymes. In general, enzymatic nucleic acids act by first binding to a target RNA. Such binding occurs through the target binding portion of an enzymatic nucleic acid which is held in close proximity to an enzymatic portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets. Thus, a single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor of gene expression, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the mechanism of target RNA cleavage. Single mismatches,

or base-substitutions, near the site of cleavage can completely eliminate catalytic activity of a ribozyme.

The enzymatic nucleic acid molecule that cleave the specified sites in PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV-specific RNAs represent a novel therapeutic approach to treat a variety of pathologic indications, including, HBV infection, hepatitis, hepatocellular carcinoma, tumorigenesis, cirrhosis, liver failure, cancers including breast, ovarian, prostate, and esophageal cancer, tumorigenesis, retinopathy, arthritis, psoriasis, female reproduction, restinosis, certain infectious diseases, transplant rejection and autoimmune disease such as multiple sclerosis, lupus, and AIDS, age related diseases such as macular degeneration and skin ulceration, Alzheimer's disease, dementia, diabetes, obesity and any other condition related to the level of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV in a cell or tissue.

In one of the preferred embodiments of the inventions described herein, the enzymatic nucleic acid molecule is formed in a hammerhead or hairpin motif, but may also be formed in the motif of a hepatitis delta virus, group I intron, group II intron or RNase P RNA (in association with an RNA guide sequence), *Neurospora* VS RNA, DNazymes, NCH cleaving motifs, or G-cleavers. Examples of such hammerhead motifs are described by Dreyfus, *supra*, Rossi *et al.*, 1992, *AIDS Research and Human Retroviruses* 8, 183. Examples of hairpin motifs are described by Hampel *et al.*, EP0360257, Hampel and Tritz, 1989 *Biochemistry* 28, 4929, Feldstein *et al.*, 1989, *Gene* 82, 53, Haseloff and Gerlach, 1989, *Gene*, 82, 43, Hampel *et al.*, 1990 *Nucleic Acids Res.* 18, 299; and Chowrira & McSwiggen, US. Patent No. 5,631,359. The hepatitis delta virus motif is described by Perrotta and Been, 1992 *Biochemistry* 31, 16. The RNase P motif is described by Guerrier-Takada *et al.*, 1983 *Cell* 35, 849; Forster and Altman, 1990, *Science* 249, 783; and Li and Altman, 1996, *Nucleic Acids Res.* 24, 835. The *Neurospora* VS RNA ribozyme motif is described by Collins (Saville and Collins, 1990 *Cell* 61, 685-696; Saville and Collins, 1991 *Proc. Natl. Acad. Sci. USA* 88, 8826-8830; Collins and Olive, 1993 *Biochemistry* 32, 2795-2799; and Guo and Collins, 1995, *EMBO. J.* 14, 363). Group II introns are described by Griffin *et al.*, 1995, *Chem. Biol.* 2, 761; Michels and Pyle, 1995, *Biochemistry* 34, 2965; and Pyle *et al.*, International PCT Publication No. WO 96/22689. The Group I intron is described by Cech *et al.*, U.S. Patent 4,987,071. DNazymes are described by Usman *et al.*, International PCT Publication No. WO 95/11304; Chartrand *et*

al., 1995, *NAR* 23, 4092; Breaker *et al.*, 1995, *Chem. Bio.* 2, 655; and Santoro *et al.*, 1997, *PNAS* 94, 4262. NCH cleaving motifs are described in Ludwig & Sproat, International PCT Publication No. WO 98/58058; and G-cleavers are described in Kore *et al.*, 1998, *Nucleic Acids Research* 26, 4116-4120 and Eckstein *et al.*, International PCT Publication No. WO 99/16871. Additional motifs include the Aptazyme (Breaker *et al.*, WO 98/43993), Amberzyme (Class I motif; **Figure 3**; Beigelman *et al.*, International PCT publication No. WO 99/55857) and Zinzyme (Beigelman *et al.*, International PCT publication No. WO 99/55857), all these references are incorporated by reference herein in their totalities, including drawings and can also be used in the present invention. These specific motifs are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target gene RNA regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart an RNA cleaving activity to the molecule (Cech *et al.*, U.S. Patent No. 4,987,071).

In preferred embodiments of the present invention, a nucleic acid molecule, *e.g.*, an antisense molecule, a triplex DNA, or a ribozyme, is 13 to 100 nucleotides in length, *e.g.*, in specific embodiments 35, 36, 37, or 38 nucleotides in length (*e.g.*, for particular ribozymes or antisense). In particular embodiments, the nucleic acid molecule is 15-100, 17-100, 20-100, 21-100, 23-100, 25-100, 27-100, 30-100, 32-100, 35-100, 40-100, 50-100, 60-100, 70-100, or 80-100 nucleotides in length. Instead of 100 nucleotides being the upper limit on the length ranges specified above, the upper limit of the length range can be, for example, 30, 40, 50, 60, 70, or 80 nucleotides. Thus, for any of the length ranges, the length range for particular embodiments has lower limit as specified, with an upper limit as specified which is greater than the lower limit. For example, in a particular embodiment, the length range can be 35-50 nucleotides in length. All such ranges are expressly included. Also in particular embodiments, a nucleic acid molecule can have a length which is any of the lengths specified above, for example, 21 nucleotides in length.

In a preferred embodiment, the invention provides a method for producing a class of nucleic acid-based gene inhibiting agents which exhibit a high degree of specificity for the RNA of a desired target. For example, the enzymatic nucleic acid molecule is preferably targeted to a highly conserved sequence region of target RNAs encoding PTP-1B, MetAP-

2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV proteins (specifically PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV RNA) such that specific treatment of a disease or condition can be provided with either one or several nucleic acid molecules of the invention. Such nucleic acid molecules can be delivered exogenously to
5 specific tissue or cellular targets as required. Alternatively, the nucleic acid molecules (e.g., ribozymes and antisense) can be expressed from DNA and/or RNA vectors that are delivered to specific cells.

As used in herein "cell" is used in its usual biological sense, and does not refer to an entire multicellular organism, e.g., specifically does not refer to a human. The cell may be
10 present in an organism which may be a human but is preferably a non-human multicellular organism, e.g., birds, plants and mammals such as cows, sheep, apes, monkeys, swine, dogs, and cats. The cell may be prokaryotic (e.g., bacterial cell) or eukaryotic (e.g., mammalian or plant cell).

By "PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV proteins" is meant, a protein or a mutant protein derivative thereof, comprising sequence
15 expressed and/or encoded by PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, genes and/or the HBV genome respectively.

By "highly conserved sequence region" is meant a nucleotide sequence of one or more regions in a target gene does not vary significantly from one generation to the other
20 or from one biological system to the other.

The enzymatic nucleic acid-based inhibitors of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV expression are useful for the prevention of the diseases and conditions including HBV infection, hepatitis, hepatocellular carcinoma, tumorigenesis, cirrhosis, liver failure, cancers including breast, ovarian, prostate, and
25 esophageal cancer, tumorigenesis, retinopathy, arthritis, psoriasis, female reproduction, restinosis, certain infectious diseases, transplant rejection and autoimmune disease such as multiple sclerosis, lupus, and AIDS, age related diseases such as macular degeneration and skin ulceration, Alzheimer's disease, dementia, diabetes, obesity and any other condition related to the level of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or
30 HBV in a cell or tissue. and any other diseases or conditions that are related to the levels of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV in a cell or tissue.

By "related" is meant that the reduction of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV expression (specifically PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV genes) RNA levels and thus reduction in the level of the respective protein will relieve, to some extent, the symptoms of the disease or

5 condition.

The nucleic acid-based inhibitors of the invention are added directly, or can be complexed with cationic lipids, packaged within liposomes, or otherwise delivered to target cells or tissues. The nucleic acid or nucleic acid complexes can be locally administered to relevant tissues *ex vivo*, or *in vivo* through injection, infusion pump or
10 stent, with or without their incorporation in biopolymers. In preferred embodiments, the enzymatic nucleic acid inhibitors comprise sequences, which are complementary to the substrate sequences in **Tables 3-31, 33, 34, 36-43, 56, 58, 59, 62, 63**. Examples of such enzymatic nucleic acid molecules also are shown in **Tables 3-29, 31, 33, 34, 37-43, 56, 58, 59, 62, 63**. Examples of such enzymatic nucleic acid molecules consist essentially of
15 sequences defined in these tables.

In yet another embodiment, the invention features antisense nucleic acid molecules including sequences complementary to the substrate sequences shown in **Tables 3-31, 33, 34, 36, 37-43, 56, 58, 59, 62, 63**. Such nucleic acid molecules can include sequences as shown for the binding arms of the enzymatic nucleic acid molecules in **Tables 3-29, 31, 20 33, 34, 37-43, 56, 58, 59, 62, 63**. Similarly, triplex molecules can be provided targeted to the corresponding DNA target regions, and containing the DNA equivalent of a target sequence or a sequence complementary to the specified target (substrate) sequence. Typically, antisense molecules will be complementary to a target sequence along a single contiguous sequence of the antisense molecule. However, in certain embodiments, an
25 antisense molecule may bind to substrate such that the substrate molecule forms a loop, and/or an antisense molecule may bind such that the antisense molecule forms a loop. Thus, the antisense molecule may be complementary to two (or even more) non-contiguous substrate sequences or two (or even more) non-contiguous sequence portions of an antisense molecule may be complementary to a target sequence or both.

30 In another aspect, the invention provides mammalian cells containing one or more nucleic acid molecules and/or expression vectors of this invention. The one or more nucleic acid molecules may independently be targeted to the same or different sites.

By "consists essentially of" is meant that the active nucleic acid molecule of the invention, for example, an enzymatic nucleic acid molecule, contains an enzymatic center or core equivalent to those in the examples, and binding arms able to bind mRNA such that cleavage at the target site occurs. Other sequences may be present which do not interfere with such cleavage. Thus, a core region may, for example, include one or more loop or stem-loop structures, which do not prevent enzymatic activity. "X" in the sequences in Tables 3, 4, 9, 10, 13, 14, 18, 19, 24, 25, 33, 34, 37, 38, 63 can be such a loop. A core sequence for a hammerhead ribozyme can be CUGAUGAG X CGAA where X=GCCGUUAGGC or other stem II region as specifically or generally known in the art.

In another aspect of the invention, ribozymes or antisense molecules that interact with target RNA molecules and inhibit PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV (specifically PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV RNA) activity are expressed from transcription units inserted into DNA or RNA vectors. The recombinant vectors are preferably DNA plasmids or viral vectors. Ribozyme or antisense expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the ribozymes or antisense are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of ribozymes or antisense. Such vectors might be repeatedly administered as necessary. Once expressed, the ribozymes or antisense bind to the target RNA and inhibit its function or expression. Delivery of ribozyme or antisense expressing vectors could be systemic, such as by intravenous or intramuscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell. Antisense DNA can be expressed via the use of a single stranded DNA intracellular expression vector.

By RNA is meant a molecule comprising at least one ribonucleotide residue. By "ribonucleotide" is meant a nucleotide with a hydroxyl group at the 2' position of a β -D-ribofuranose moiety.

By "vectors" is meant any nucleic acid- and/or viral-based technique used to deliver a desired nucleic acid.

By "patient" is meant an organism, which is a donor or recipient of explanted cells or the cells themselves. "Patient" also refers to an organism to which the nucleic acid molecules of the invention can be administered. Preferably, a patient is a mammal or mammalian cells. More preferably, a patient is a human or human cells.

- 5 The nucleic acid molecules of the instant invention, individually, or in combination or in conjunction with other drugs, can be used to treat diseases or conditions discussed above. For example, to treat a disease or condition associated with PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV, the patient may be treated, or other appropriate cells may be treated, as is evident to those skilled in the art, individually or in
10 combination with one or more drugs under conditions suitable for the treatment.

- In a further embodiment, the described molecules, such as antisense or ribozymes, can be used in combination with other known treatments to treat conditions or diseases discussed above. For example, the described molecules could be used in combination with one or more known therapeutic agents to treat HBV infection, hepatitis, hepatocellular
15 carcinoma, tumorigenesis, cirrhosis, liver failure, cancers including breast, ovarian, prostate, and esophageal cancer, tumorigenesis, retinopathy, arthritis, psoriasis, female reproduction, restinosis, certain infectious diseases, transplant rejection and autoimmune disease such as multiple sclerosis, lupus, and AIDS, age related diseases such as macular degeneration and skin ulceration, Alzheimer's disease, dementia, diabetes, and/or obesity.

- 20 In another preferred embodiment, the invention features nucleic acid-based inhibitors (e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups) and methods for their use to down regulate or inhibit the expression of RNA (e.g., PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV) capable of progression
25 and/or maintenance of HBV infection, hepatitis, hepatocellular carcinoma, tumorigenesis, cirrhosis, liver failure, cancers including breast, ovarian, prostate, and esophageal cancer, tumorigenesis, retinopathy, arthritis, psoriasis, female reproduction, restinosis, certain infectious diseases, transplant rejection and autoimmune disease such as multiple sclerosis, lupus, and AIDS, age related diseases such as macular degeneration and skin ulceration,
30 Alzheimer's disease, dementia, diabetes, and/or obesity.

In another preferred embodiment, the invention features nucleic acid-based techniques (e.g., enzymatic nucleic acid molecules (ribozymes), antisense nucleic acids, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups) and methods for their use to down regulate or inhibit the expression of PTP-1B, MetAP-2,

5 BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV RNA expression.

By "comprising" is meant including, but not limited to, whatever follows the word "comprising". Thus, use of the term "comprising" indicates that the listed elements are required or mandatory, but that other elements are optional and may or may not be present. By "consisting of" is meant including, and limited to, whatever follows the phrase

10 "consisting of". Thus, the phrase "consisting of" indicates that the listed elements are required or mandatory, and that no other elements may be present. By "consisting essentially of" is meant including any elements listed after the phrase, and limited to other elements that do not interfere with or contribute to the activity or action specified in the disclosure for the listed elements. Thus, the phrase "consisting essentially of" indicates
15 that the listed elements are required or mandatory, but that other elements are optional and may or may not be present depending upon whether or not they affect the activity or action of the listed elements.

Other features and advantages of the invention will be apparent from the following description of the preferred embodiments thereof, and from the claims.

20

Description Of The Preferred Embodiments

The drawings will first briefly be described.

Drawings:

25 **Figure 1** shows the secondary structure model for seven different classes of enzymatic nucleic acid molecules. Arrow indicates the site of cleavage. ----- indicate the target sequence. Lines interspersed with dots are meant to indicate tertiary interactions. - is meant to indicate base-paired interaction. **Group I Intron:** P1-P9.0 represent various stem-loop structures (Cech *et al.*, 1994, *Nature Struct. Bio.*, 1, 273). **RNase P (MIRNA):**
30 EGS represents external guide sequence (Forster *et al.*, 1990, *Science*, 249, 783; Pace *et al.*, 1990, *J. Biol. Chem.*, 265, 3587). **Group II Intron:** 5'SS means 5' splice site; 3'SS means 3'-splice site; IBS means intron binding site; EBS means exon binding site (Pyle *et*

al., 1994, *Biochemistry*, 33, 2716). **VS RNA**: I-VI are meant to indicate six stem-loop structures; shaded regions are meant to indicate tertiary interaction (Collins, International PCT Publication No. WO 96/19577). **HDV Ribozyme**: I-IV are meant to indicate four stem-loop structures (Been *et al.*, US Patent No. 5,625,047). **Hammerhead Ribozyme**: I-III are meant to indicate three stem-loop structures; stems I-III can be of any length and may be symmetrical or asymmetrical (Usman *et al.*, 1996, *Curr. Op. Struct. Bio.*, 1, 527). **Halpin Ribozyme**: Helix 1, 4 and 5 can be of any length; Helix 2 is between 3 and 8 base-pairs long; Y is a pyrimidine; Helix 2 (H2) is provided with a least 4 base pairs (*i.e.*, n is 1, 2, 3 or 4) and helix 5 can be optionally provided of length 2 or more bases (preferably 3 - 20 bases, *i.e.*, m is from 1 - 20 or more). Helix 2 and helix 5 may be covalently linked by one or more bases (*i.e.*, r is ≥ 1 base). Helix 1, 4 or 5 may also be extended by 2 or more base pairs (*e.g.*, 4 - 20 base pairs) to stabilize the ribozyme structure, and preferably is a protein binding site. In each instance, each N and N' independently is any normal or modified base and each dash represents a potential base-pairing interaction. These nucleotides may be modified at the sugar, base or phosphate. Complete base-pairing is not required in the helices, but is preferred. Helix 1 and 4 can be of any size (*i.e.*, o and p is each independently from 0 to any number, *e.g.*, 20) as long as some base-pairing is maintained. Essential bases are shown as specific bases in the structure, but those in the art will recognize that one or more may be modified chemically (abasic, base, sugar and/or phosphate modifications) or replaced with another base without significant effect. Helix 4 can be formed from two separate molecules, *i.e.*, without a connecting loop. The connecting loop when present may be a ribonucleotide with or without modifications to its base, sugar or phosphate. "q" ≥ 2 bases. The connecting loop can also be replaced with a non-nucleotide linker molecule. H refers to bases A, U, or C. Y refers to pyrimidine bases. "_____" refers to a covalent bond. (Burke *et al.*, 1996, *Nucleic Acids & Mol. Biol.*, 10, 129; Chowrira *et al.*, US Patent No. 5,631,359).

Figure 2 shows examples of chemically stabilized ribozyme motifs. **HH Rz**, represents hammerhead ribozyme motif (Usman *et al.*, 1996, *Curr. Op. Struct. Bio.*, 1, 527); **NCH Rz** represents the NCH ribozyme motif (described herein and in Ludwig & Sproat, International PCT Publication No. WO 98/58058); **G-Cleaver**, represents G-cleaver ribozyme motif (Kore *et al.*, 1998, *Nucleic Acids Research*, 26, 4116-4120). N or

n, represent independently a nucleotide which may be same or different and have complementarity to each other; **ri**, represents ribo-Inosine nucleotide; arrow indicates the site of cleavage within the target. Position 4 of the HH Rz and the NCH Rz is shown as having 2'-C-allyl modification, but those skilled in the art will recognize that this position
5 can be modified with other modifications well known in the art, so long as such modifications do not significantly inhibit the activity of the ribozyme.

Figure 3 shows an example of the Amberzyme ribozyme motif that is chemically stabilized (see, for example, Beigelman *et al.*, International PCT publication No. WO 99/55857; also referred to as Class I Motif). The Amberzyme motif is a class of enzymatic
10 nucleic acid molecules that do not require the presence of a ribonucleotide (2'-OH) group for activity.

Figure 4 shows an example of the Zinzyme A ribozyme motif that is chemically stabilized (see, for example, International PCT publication No. WO 99/55857; also referred to as Class A Motif). The Zinzyme motif is a class of enzymatic nucleic acid
15 molecules that do not require the presence of a ribonucleotide (2'-OH) group for activity.

Figure 5 shows an example of a DNAzyme motif described by Santoro *et al.*, 1997, PNAS, 94, 4262.

Figure 6 is a diagrammatic representation of the hammerhead ribozyme motif known in the art and the NCH motif. Stem II can be 2 base-pair long, preferably, 2, 3,
20 4, 5, 6, 7, 8, and 10 base-pairs long. Each N and N' is independently any base or non-nucleotide as used herein; X is adenosine, cytidine or uridine; Stem I-III are meant to indicate three stem-loop structures; stems I-III can be of any length and may be symmetrical or asymmetrical (Usman *et al.*, 1996, *Curr. Op. Struct. Bio.*, 1, 527); arrow indicates the site of cleavage in the target RNA; Rz refers to ribozyme; Loop II may be
25 present or absent. If Loop II is present it is greater than or equal to three nucleotides, preferably four nucleotides. The Loop II sequence is preferably 5'-GAAA-3' or 5'-GUUA-3'.

Figure 7 shows examples of chemically stabilized ribozyme motifs. **HH Rz**, represents hammerhead ribozyme motif (Usman *et al.*, 1996, *Curr. Op. Struct. Bio.*, 1,
30 527); **NCH-Inosine Rz** represents the NCH ribozyme motif with riboinosine at 15.1 position; **NCH-Xylo Rz** represents the NCH ribozyme with xylo inosine at 15.1 position. N or n, represent independently a nucleotide which may be same or different and may have

complementarity to each other; **ri**, represents ribo-Inosine nucleotide; **xi** represent xylo-
inosine; arrow indicates the site of cleavage within the target. Position 4 of the HH Rz and
the NCH Rzs is shown as having 2'-C-allyl modification, but those skilled in the art will
recognize that this position can be modified with other modifications well known in the
art, so long as such modifications do not significantly inhibit the activity of the ribozyme.

Figure 8 is a graphical representation of data showing inhibition of cell proliferation
mediated by NCH and HH ribozymes targeted against HER2/*neu*/ErbB2 gene. Untreated,
refers to cells not treated with ribozymes; HH RZ refers to hammerhead ribozyme; NCX
RZ refers to the NCH ribozymes of the invention; IA refers to catalytically inactive or
attenuated ribozyme used as a control.

Figure 9 is a schematic diagram of the process for the synthesis of beta-D-
xylofuranosyl hypoxanthine 3'-phosphoramidite.

Figure 10 displays a schematic representation of NTP synthesis using nucleoside
substrates.

Figure 11 shows a scheme for an in vitro selection method. A pool of nucleic acid
molecules is generated with a random core region and one or more region(s) with a defined
sequence. These nucleic acid molecules are bound to a column containing immobilized
oligonucleotide with a defined sequence, where the defined sequence is complementary to
region(s) of defined sequence of nucleic acid molecules in the pool. Those nucleic acid
molecules capable of cleaving the immobilized oligonucleotide (target) in the column are
isolated and converted to complementary DNA (cDNA), followed by transcription using
NTPs to form a new nucleic acid pool.

Figure 12 shows a scheme for a two column in vitro selection method. A pool of
nucleic acid molecules is generated with a random core and two flanking regions (region A
and region B) with defined sequences. The pool is passed through a column which has
immobilized oligonucleotides with regions A' and B' that are complementary to regions A
and B of the nucleic acid molecules in the pool, respectively. The column is subjected to
conditions sufficient to facilitate cleavage of the immobilized oligonucleotide target. The
molecules in the pool that cleave the target (active molecules) have A' region of the target
bound to their A region, whereas the B region is free. The column is washed to isolate the
active molecules with the bound A' region of the target. This pool of active molecules
may also contain some molecules that are not active to cleave the target (inactive

molecules) but have dissociated from the column. To separate the contaminating inactive molecules from the active molecules, the pool is passed through a second column (column 2) which contains immobilized oligonucleotides with the A' sequence but not the B' sequence. The inactive molecules will bind to column 2 but the active molecules will not bind to column 2 because their A region is occupied by the A' region of the target oligonucleotide from column 1. Column 2 is washed to isolate the active molecules for further processing as described in the scheme shown in **Figure 11**.

Figure 13 is a diagram of a novel 48 nucleotide enzymatic nucleic acid motif which was identified using in vitro methods described in the instant invention. The molecule shown is only exemplary. The 5' and 3' terminal nucleotides (referring to the nucleotides of the substrate binding arms rather than merely the single terminal nucleotide on the 5' and 3' ends) can be varied so long as those portions can base-pair with target substrate sequence. In addition, the guanosine (G) shown at the cleavage site of the substrate can be changed to other nucleotides so long as the change does not eliminate the ability of enzymatic nucleic acid molecules to cleave the target sequence. Substitutions in the nucleic acid molecule and/or in the substrate sequence can be readily tested, for example, as described herein.

Figure 14 is a schematic diagram of HCV luciferase assay used to demonstrate efficacy of class I enzymatic nucleic acid molecule motif.

Figure 15 is a graph indicating the dose curve of an enzymatic nucleic acid molecule targeting site 146 on HCV RNA.

Figure 16 is a bar graph showing enzymatic nucleic acid molecules targeting 4 sites within the HCV RNA are able to reduce RNA levels in cells.

Figure 17 shows secondary structures and cleavage rates for characterized Class II enzymatic nucleic acid motifs.

Figure 18 is a diagram of a novel 35 nucleotide enzymatic nucleic acid motif which was identified using in vitro methods described in the instant invention. The molecule shown is only exemplary. The 5' and 3' terminal nucleotides (referring to the nucleotides of the substrate binding arms rather than merely the single terminal nucleotide on the 5' and 3' ends) can be varied so long as those portions can base-pair with target substrate sequence. In addition, the guanosine (G) shown at the cleavage site of the substrate can be changed to other nucleotides so long as the change does not eliminate the ability of

enzymatic nucleic acid molecules to cleave the target sequence. Substitutions in the nucleic acid molecule and/or in the substrate sequence can be readily tested, for example, as described herein.

5 **Figure 19** is a bar graph showing substrate specificities for Class II (zinzyme) ribozymes.

Figure 20 is a bar graph showing Class II enzymatic nucleic acid molecules targeting 10 representative sites within the HER2 RNA in a cellular proliferation screen.

Figure 21 is a synthetic scheme outlining the synthesis of 5-[3-aminopropynyl(propyl)]uridine 5'-triphosphates and 4-imidazoleacetic acid conjugates.

10 **Figure 22** is a synthetic scheme outlining the synthesis of 5-[3-(N-4-imidazoleacetyl)aminopropynyl(propyl)]uridine 5'-triphosphates.

Figure 23 is a synthetic scheme outlining the synthesis of carboxylate tethered uridine 5'-triphosphates.

15 **Figure 24** is a synthetic scheme outlining the synthesis of 5-(3-aminoalkyl) and 5-[3(N-succinyl)aminopropyl] functionalized cytidines.

Figure 25 is a diagram of a class I ribozyme stem truncation and loop replacement analysis.

Figure 26 is a diagram of class I ribozymes with truncated stem(s) and/or non-nucleotide linkers used in loop structures.

20 **Figure 27** is a diagram of "no-ribo" class II ribozymes.

Figure 28 is a graph showing cleavage reactions with class II ribozymes under differing divalent metal concentrations.

Figure 29 is a diagram of differing class II ribozymes with varying ribo content and their relative rates of catalysis.

25 **Figure 30** is a graph showing class II ribozyme (zinzyme) mediated reduction of HER2 RNA in SKBR3 breast carcinoma cells. Cells were treated with 100 nm, and 200 nm of zinzyme (RPI 18656) targeting site 972 of HER2 RNA and a corresponding scrambled attenuated control complexed with 2.5 µg/ml of lipid. Active zinzymes and scrambled attenuated controls were compared to untreated cells after 24 hours post
30 treatment.

Figure 31 is a graph showing class II ribozyme (zinzyme) mediated dose response anti-proliferation assay in SKBR3 breast carcinoma cells. Cells were treated with 100 nm, and 200 nm of zinzyme (RPI 18656) targeting site 972 of HER2 RNA and a corresponding scrambled attenuated control complexed with 2.0 µg/ml of lipid. Active zinzymes and scrambled attenuated controls were compared to untreated cells after 24 hours post treatment.

Figure 32 is a graph which shows the dose dependent reduction of HER2 RNA in SKOV-3 cells treated with RPI 19293 from 0 to 100 nM with 5.0 µg/ml of cationic lipid.

Figure 33 is a graph which shows the dose dependent reduction of HER2 RNA and inhibition of cellular proliferation in SKBR-3 cells treated with RPI 19293 from 0 to 400 nM with 5.0 µg/ml of cationic lipid.

Figure 34 shows a non-limiting example of the replacement of a 2'-O-methyl 5'-CA-3' with a ribo G in the class II (zinzyme) motif. The representative motif shown for the purpose of the figure is a "seven-ribo" zinzyme motif, however, the interchangeability of a G and a CA in the position shown in **Figure 25** of the class II (zinzyme) motif extends to any combination of 2-O-methyl and ribo residues. For instance, a 2'-O-methyl G can replace the 2'-O-methyl 5'-CA-3' and vice versa.

Figure 35 is a graph which shows a screen of class II ribozymes (zinzymes) targeting site 972 of HER2 RNA which contain ribo-G reductions (RPI 19727 = no ribo, RPI 19728 = one ribo, RPI 19293 = two ribo, RPI 19729 = three ribo, RPI 19730 = four ribo, RPI 19731 = five ribo, and RPI 19292 = seven ribo) for anti-proliferative activity in SKBR3 cells.

Figure 36 summarizes the results of functional group modification studies in which various nucleoside analogs were tested for activity in the NCH ribozyme motif. K_{rel} values describe the cleavage values of a given substituent at position 15.1 relative the Inosine at position 15.1 (I-15.1).

Figure 37 summarizes reported functional group modification studies performed at the A 15.1 residue in the A-15.1 •U-16.1 context of NUH cleaving ribozymes. K_{rel} values describe the cleavage values of a given substituent at position 15.1 relative the adenosine at position 15.1 (A-15.1).

Mechanism of action of Nucleic Acid Molecules of the Invention

Antisense: Antisense molecules may be modified or unmodified RNA, DNA, or mixed polymer oligonucleotides and primarily function by specifically binding to matching sequences resulting in inhibition of peptide synthesis (Wu-Pong, Nov 1994, *BioPharm*, 20-33). The antisense oligonucleotide binds to target RNA by Watson Crick base-pairing and blocks gene expression by preventing ribosomal translation of the bound sequences either by steric blocking or by activating RNase H enzyme. Antisense molecules may also alter protein synthesis by interfering with RNA processing or transport from the nucleus into the cytoplasm (Mukhopadhyay & Roth, 1996, *Crit. Rev. in Oncogenesis* 7, 151-190).

In addition, binding of single stranded DNA to RNA may result in nuclease degradation of the heteroduplex (Wu-Pong, *supra*; Crooke, *supra*). To date, the only backbone modified DNA chemistry which will act as substrates for RNase H are phosphorothioates, phosphorodithioates, and borontrifluoridates. Recently, it has been reported that 2'-arabino and 2'-fluoro arabino- containing oligos can also activate RNase H activity.

A number of antisense molecules have been described that utilize novel configurations of chemically modified nucleotides, secondary structure, and/or RNase H substrate domains (Woelf *et al.*, International PCT Publication No. WO 98/13526; Thompson *et al.*, International PCT Publication No. WO 99/54459 ; Hartmann *et al.*, International PCT Publication No. WO 00/17346) all of these are incorporated by reference herein in their entirety.

Antisense DNA can be used to target RNA by means of DNA-RNA interactions, thereby activating RNase H, which digests the target RNA in the duplex. Antisense DNA can be chemically synthesized or can be expressed via the use of a single stranded DNA intracellular expression vector or the equivalent thereof.

Triplex Forming Oligonucleotides (TFO): Single stranded DNA may be designed to bind to genomic DNA in a sequence specific manner. TFOs are comprised of pyrimidine-rich oligonucleotides which bind DNA helices through Hoogsteen Base-pairing (Wu-Pong, *supra*). The resulting triple helix composed of the DNA sense, DNA antisense, and TFO disrupts RNA synthesis by RNA polymerase. The TFO mechanism may result in gene expression or cell death since binding may be irreversible (Mukhopadhyay & Roth, *supra*)

2'-5' Oligoadenylates: The 2-5 A system is an interferon-mediated mechanism for RNA degradation found in higher vertebrates (Mitra *et al.*, 1996, *Proc Nat Acad Sci USA* 93, 6780-6785). Two types of enzymes, 2-5A synthetase and RNase L, are required for RNA cleavage. The 2-5A synthetases require double stranded RNA to form 2'-5'

- 5 oligoadenylates (2-5A). 2-5A then acts as an allosteric effector for utilizing RNase L which has the ability to cleave single stranded RNA. The ability to form 2-5A structures with double stranded RNA makes this system particularly useful for inhibition of viral replication.

- (2'-5') oligoadenylate structures may be covalently linked to antisense molecules to
10 form chimeric oligonucleotides capable of RNA cleavage (Torrence, *supra*). These molecules putatively bind and activate a 2-5A dependent RNase, the oligonucleotide/enzyme complex then binds to a target RNA molecule which can then be cleaved by the RNase enzyme. The covalent attachment of 2'-5' oligoadenylate structures is not limited to antisense applications, and can be further elaborated to include attachment
15 to nucleic acid molecules of the instant invention.

- Enzymatic Nucleic Acid: Seven basic varieties of naturally-occurring enzymatic RNAs are presently known. In addition, several *in vitro* selection (evolution) strategies (Orgel, 1979, *Proc. R. Soc. London*, B 205, 435) have been used to evolve new nucleic acid catalysts capable of catalyzing cleavage and ligation of phosphodiester linkages
20 (Joyce, 1989, *Gene*, 82, 83-87; Beaudry *et al.*, 1992, *Science* 257, 635-641; Joyce, 1992, *Scientific American* 267, 90-97; Breaker *et al.*, 1994, *TIBTECH* 12, 268; Bartel *et al.*, 1993, *Science* 261:1411-1418; Szostak, 1993, *TIBS* 17, 89-93; Kumar *et al.*, 1995, *FASEB J.*, 9, 1183; Breaker, 1996, *Curr. Op. Biotech.*, 7, 442; Santoro *et al.*, 1997, *Proc. Natl. Acad. Sci.*, 94, 4262; Tang *et al.*, 1997, *RNA* 3, 914; Nakamaye & Eckstein, 1994, *supra*; Long &
25 Uhlenbeck, 1994, *supra*; Ishizaka *et al.*, 1995, *supra*; Vaish *et al.*, 1997, *Biochemistry* 36, 6495; all of these are incorporated by reference herein). Each can catalyze a series of reactions including the hydrolysis of phosphodiester bonds in *trans* (and thus can cleave other RNA molecules) under physiological conditions.

- In general, enzymatic nucleic acids act by first binding to a target RNA. Such
30 binding occurs through the target binding portion of an enzymatic nucleic acid which is held in close proximity to an enzymatic portion of the molecule that acts to cleave the target RNA. Thus, the enzymatic nucleic acid first recognizes and then binds a target

RNA through complementary base-pairing, and once bound to the correct site, acts enzymatically to cut the target RNA. Strategic cleavage of such a target RNA will destroy its ability to direct synthesis of an encoded protein. After an enzymatic nucleic acid has bound and cleaved its RNA target, it is released from that RNA to search for another target and can repeatedly bind and cleave new targets.

Nucleic acid molecules of this invention will block to some extent PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV protein expression and can be used to treat disease or diagnose disease associated with the levels of PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV.

The enzymatic nature of a ribozyme has significant advantages, such as the concentration of ribozyme necessary to affect a therapeutic treatment is low. This advantage reflects the ability of the ribozyme to act enzymatically. Thus, a single ribozyme molecule is able to cleave many molecules of target RNA. In addition, the ribozyme is a highly specific inhibitor, with the specificity of inhibition depending not only on the base-pairing mechanism of binding to the target RNA, but also on the mechanism of target RNA cleavage. Single mismatches, or base-substitutions, near the site of cleavage can be chosen to completely eliminate catalytic activity of a ribozyme.

Nucleic acid molecules having an endonuclease enzymatic activity are able to repeatedly cleave other separate RNA molecules in a nucleotide base sequence-specific manner. Such enzymatic nucleic acid molecules can be targeted to virtually any RNA transcript, and achieve efficient cleavage *in vitro* (Zaug *et al.*, 324, *Nature*, 429 1986; Uhlenbeck, 1987 *Nature*, 328, 596; Kim *et al.*, 84 *Proc. Natl. Acad. Sci. USA*, 8788, 1987; Dreyfus, 1988, *Einstein Quart. J. Bio. Med.*, 6, 92; Haseloff and Gerlach, 334 *Nature*, 585, 1988; Cech, 260 *JAMA*, 3030, 1988; Jefferies *et al.*, 17 *Nucleic Acids Research*, 1371, 1989; and Santoro *et al.*, 1997 *supra*).

Because of their sequence specificity, *trans*-cleaving ribozymes show promise as therapeutic agents for human disease (Usman & McSwiggen, 1995 *Ann. Rep. Med. Chem.* 30, 285-294; Christoffersen and Marr, 1995 *J. Med. Chem.* 38, 2023-2037). Ribozymes can be designed to cleave specific RNA targets within the background of cellular RNA. Such a cleavage event renders the RNA non-functional and abrogates protein expression from that RNA. In this manner, synthesis of a protein associated with a disease state can be selectively inhibited (Warashina *et al.*, 1999, *Chemistry and Biology*, 6, 237-250).

The nucleic acid molecules of the instant invention are also referred to as GeneBloc™ reagents, which are essentially nucleic acid molecules (e.g.; ribozymes, antisense) capable of down-regulating gene expression.

5 Target sites

Targets for useful ribozymes and antisense nucleic acids can be determined as disclosed in Draper *et al.*, WO 93/23569; Sullivan *et al.*, WO 93/23057; Thompson *et al.*, WO 94/02595; Draper *et al.*, WO 95/04818; McSwiggen *et al.*, US Patent No. 5,525,468, and all hereby incorporated in their entireties by reference herein. Other examples include

10 the following PCT applications, which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, all incorporated by reference herein. Rather than repeat the guidance provided in those documents here, below are provided specific examples of such methods, not limiting to those in the art. Ribozymes and antisense to such targets are designed as described in those applications and

15 synthesized to be tested *in vitro* and *in vivo*, as also described. The sequence of human PTP-1B, MetAP-2, BACE, ps-1, ps-2, HER2, PLN, TERT, and/or HBV RNAs (for example, GenBank accession Nos. (PTP-1B, NM_002827), (MetAP-2, U29607), (BACE, AF190725), (ps-1, L76517), (ps-2, L43964), (HER2/c-erb2/neu, X03363), (PLN, NM_002667), (TERT, NM_003219) and (HBV, AF100308.1, HBV strain 2-18;

20 additionally, other HBV strains can be screened by one skilled in the art, see Table 35 for other possible strains) were screened for optimal enzymatic nucleic acid and antisense target sites using a computer-folding algorithm. Antisense, hammerhead, DNAzyme, NCH (Inozyme), amberzyme, zinzyme or G-Cleaver ribozyme binding/cleavage sites were identified. These sites are shown in Tables 3-29, 31, 33, 34, 37-43, 56, 58, 59, 62, 63 (all

25 sequences are 5' to 3' in the tables; X can be any base-paired sequence, the actual sequence is not relevant here). The nucleotide base position is noted in the Tables as that site to be cleaved by the designated type of enzymatic nucleic acid molecule. Table 36 shows substrate positions selected from Renbo *et al.*, 1987, *Sci. Sin.*, 30, 507, used in Draper, US patent No. 6,017,756 entitled "METHOD AND REAGENT FOR

30 INHIBITING HEPATITIS B VIRUS REPLICATION" and Draper *et al.*, International PCT publication No. WO 93/23569, filed April 29, 1993, entitled "METHOD AND REAGENT FOR INHIBITING VIRAL REPLICATION". While human sequences can be

screened and enzymatic nucleic acid molecule and/or antisense thereafter designed, as discussed in Stinchcomb *et al.*, WO 95/23225, mouse targeted ribozymes may be useful to test efficacy of action of the enzymatic nucleic acid molecule and/or antisense prior to testing in humans.

- 5 Antisense, hammerhead, DNzyme, NCH (Inozyme), amberzyme, zinzyme or G-Cleaver ribozyme binding/cleavage sites were identified, as discussed above. The nucleic acid molecules were individually analyzed by computer folding (Jaeger *et al.*, 1989 *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the sequences fold into the appropriate secondary structure. Those nucleic acid molecules with unfavorable intramolecular
- 10 interactions such as between the binding arms and the catalytic core were eliminated from consideration. Varying binding arm lengths can be chosen to optimize activity.

- Antisense, hammerhead, DNzyme, NCH, amberzyme, zinzyme or G-Cleaver ribozyme binding/cleavage sites were identified and were designed to anneal to various sites in the RNA target. The binding arms are complementary to the target site sequences
- 15 described above. The nucleic acid molecules were chemically synthesized. The method of synthesis used follows the procedure for normal DNA/RNA synthesis as described below and in Usman *et al.*, 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe *et al.*, 1990 *Nucleic Acids Res.*, 18, 5433; Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684; and Caruthers *et al.*, 1992, *Methods in Enzymology* 211,3-19.

20

Synthesis of Nucleic acid Molecules

- Synthesis of nucleic acids greater than 100 nucleotides in length is difficult using automated methods, and the therapeutic cost of such molecules is prohibitive. In this invention, small nucleic acid motifs ("small refers to nucleic acid motifs no more than 100
- 25 nucleotides in length, preferably no more than 80 nucleotides in length, and most preferably no more than 50 nucleotides in length; *e.g.*, antisense oligonucleotides, hammerhead or the NCH ribozymes) are preferably used for exogenous delivery. The simple structure of these molecules increases the ability of the nucleic acid to invade targeted regions of RNA structure. Exemplary molecules of the instant invention are
- 30 chemically synthesized, and others can similarly be synthesized.

- Oligonucleotides (e.g.; antisense GeneBlocs) are synthesized using protocols known in the art as described in Caruthers *et al.*, 1992, *Methods in Enzymology* 211, 3-19, Thompson *et al.*, International PCT Publication No. WO 99/54459, Wincott *et al.*, 1995, *Nucleic Acids Res.* 23, 2677-2684, Wincott *et al.*, 1997, *Methods Mol. Bio.*, 74, 59,
- 5 Brennan *et al.*, 1998, *Biotechnol Bioeng.*, 61, 33-45, and Brennan, US patent No. 6,001,311. All of these references are incorporated herein by reference. The synthesis of oligonucleotides makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. In a non-limiting example, small scale syntheses are conducted on a 394 Applied Biosystems, Inc.
- 10 synthesizer using a 0.2 μ mol scale protocol with a 2.5 min coupling step for 2'-O-methylated nucleotides and a 45 sec coupling step for 2'-deoxy nucleotides. **Table II** outlines the amounts and the contact times of the reagents used in the synthesis cycle. Alternatively, syntheses at the 0.2 μ mol scale can be performed on a 96-well plate synthesizer, such as the instrument produced by Protogene (Palo Alto, CA) with minimal
- 15 modification to the cycle. A 33-fold excess (60 μ L of 0.11 M = 6.6 μ mol) of 2'-O-methyl phosphoramidite and a 105-fold excess of S-ethyl tetrazole (60 μ L of 0.25 M = 15 μ mol) can be used in each coupling cycle of 2'-O-methyl residues relative to polymer-bound 5'-hydroxyl. A 22-fold excess (40 μ L of 0.11 M = 4.4 μ mol) of deoxy phosphoramidite and a 70-fold excess of S-ethyl tetrazole (40 μ L of 0.25 M = 10 μ mol) can be used in each
- 20 coupling cycle of deoxy residues relative to polymer-bound 5'-hydroxyl. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by colorimetric quantitation of the trityl fractions, are typically 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer include the following: detritylation solution is 3% TCA in methylene chloride (ABI);
- 25 capping is performed with 16% *N*-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); and oxidation solution is 16.9 mM I₂, 49 mM pyridine, 9% water in THF (PERSEPTIVE™). Burdick & Jackson Synthesis Grade acetonitrile is used directly from the reagent bottle. S-Ethyltetrazole solution (0.25 M in acetonitrile) is made up from the solid obtained from American International Chemical,
- 30 Inc. Alternately, for the introduction of phosphorothioate linkages, Beaucage reagent (3H-1,2-Benzodithiol-3-one 1,1-dioxide, 0.05 M in acetonitrile) is used.

Deprotection of the antisense oligonucleotides is performed as follows: the polymer-bound trityl-on oligonucleotide is transferred to a 4 mL glass screw top vial and suspended in a solution of 40% aq. methylamine (1 mL) at 65 °C for 10 min. After cooling to -20 °C, the supernatant is removed from the polymer support. The support is washed three times with 1.0 mL of EtOH:MeCN:H₂O/3:1:1, vortexed and the supernatant is then added to the first supernatant. The combined supernatants, containing the oligonucleotide, are dried to a white powder.

The method of synthesis used for normal RNA including certain enzymatic nucleic acid molecules follows the procedure as described in Usman *et al.*, 1987, *J. Am. Chem. Soc.*, 109, 7845; Scaringe *et al.*, 1990, *Nucleic Acids Res.*, 18, 5433; and Wincott *et al.*, 1995, *Nucleic Acids Res.* 23, 2677-2684 Wincott *et al.*, 1997, *Methods Mol. Bio.*, 74, 59, and makes use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. In a non-limiting example, small scale syntheses are conducted on a 394 Applied Biosystems, Inc. synthesizer using a 0.2 µmol scale protocol with a 7.5 min coupling step for alkylsilyl protected nucleotides and a 2.5 min coupling step for 2'-O-methylated nucleotides. Table II outlines the amounts and the contact times of the reagents used in the synthesis cycle. Alternatively, syntheses at the 0.2 µmol scale can be done on a 96-well plate synthesizer, such as the instrument produced by Protogene (Palo Alto, CA) with minimal modification to the cycle. A 33-fold excess (60 µL of 0.11 M = 6.6 µmol) of 2'-O-methyl phosphoramidite and a 75-fold excess of S-ethyl tetrazole (60 µL of 0.25 M = 15 µmol) can be used in each coupling cycle of 2'-O-methyl residues relative to polymer-bound 5'-hydroxyl. A 66-fold excess (120 µL of 0.11 M = 13.2 µmol) of alkylsilyl (ribo) protected phosphoramidite and a 150-fold excess of S-ethyl tetrazole (120 µL of 0.25 M = 30 µmol) can be used in each coupling cycle of ribo residues relative to polymer-bound 5'-hydroxyl. Average coupling yields on the 394 Applied Biosystems, Inc. synthesizer, determined by colorimetric quantitation of the trityl fractions, are typically 97.5-99%. Other oligonucleotide synthesis reagents for the 394 Applied Biosystems, Inc. synthesizer include the following: detritylation solution is 3% TCA in methylene chloride (ABI); capping is performed with 16% N-methyl imidazole in THF (ABI) and 10% acetic anhydride/10% 2,6-lutidine in THF (ABI); oxidation solution is 16.9 mM I₂, 49 mM pyridine, 9% water in THF (PERSEPTIVE™). Burdick & Jackson Synthesis Grade

acetonitrile is used directly from the reagent bottle. S-Ethyltetrazole solution (0.25 M in acetonitrile) is made up from the solid obtained from American International Chemical, Inc. Alternately, for the introduction of phosphorothioate linkages, Beaucage reagent (3H-1,2-Benzodithiol-3-one 1,1-dioxide 0.05 M in acetonitrile) is used.

- 5 Deprotection of the RNA is performed using either a two-pot or one-pot protocol. For the two-pot protocol, the polymer-bound trityl-on oligoribonucleotide is transferred to a 4 mL glass screw top vial and suspended in a solution of 40% aq. methylamine (1 mL) at 65 °C for 10 min. After cooling to -20 °C, the supernatant is removed from the polymer support. The support is washed three times with 1.0 mL of EtOH:MeCN:H₂O/3:1:1, 10 vortexed and the supernatant is then added to the first supernatant. The combined supernatants, containing the oligoribonucleotide, are dried to a white powder. The base deprotected oligoribonucleotide is resuspended in anhydrous TEA/HF/NMP solution (300 µL of a solution of 1.5 mL N-methylpyrrolidinone, 750 µL TEA and 1 mL TEA•3HF to provide a 1.4 M HF concentration) and heated to 65 °C. After 1.5 h, the oligomer is 15 quenched with 1.5 M NH₄HCO₃.

- Alternatively, for the one-pot protocol, the polymer-bound trityl-on oligoribonucleotide is transferred to a 4 mL glass screw top vial and suspended in a solution of 33% ethanolic methylamine/DMSO: 1/1 (0.8 mL) at 65 °C for 15 min. The vial is brought to r.t. TEA•3HF (0.1 mL) is added and the vial is heated at 65 °C for 15 20 min. The sample is cooled at -20 °C and then quenched with 1.5 M NH₄HCO₃.

- For purification of the trityl-on oligomers, the quenched NH₄HCO₃ solution is loaded onto a C-18 containing cartridge that had been prewashed with acetonitrile followed by 50 mM TEAA. After washing the loaded cartridge with water, the RNA is detritylated with 0.5% TFA for 13 min. The cartridge is then washed again with water, 25 salt exchanged with 1 M NaCl and washed with water again. The oligonucleotide is then eluted with 30% acetonitrile.

- Inactive hammerhead ribozymes or binding attenuated control (BAC) oligonucleotides are synthesized by substituting a U for G₅ and a U for A₁₄ (numbering from Hertel, K. J., et al., 1992, *Nucleic Acids Res.*, 20, 3252). Similarly, one or more 30 nucleotide substitutions can be introduced in other enzymatic nucleic acid molecules to inactivate the molecule and such molecules can serve as a negative control.

The average stepwise coupling yields are typically >98% (Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684). Those of ordinary skill in the art will recognize that the scale of synthesis can be adapted to be larger or smaller than the example described above including but not limited to 96-well format, all that is important is the ratio of

5 chemicals used in the reaction.

Alternatively, the nucleic acid molecules of the present invention can be synthesized separately and joined together post-synthetically, for example, by ligation (Moore *et al.*, 1992, *Science* 256, 9923; Draper *et al.*, International PCT publication No. WO 93/23569; Shabarova *et al.*, 1991, *Nucleic Acids Research* 19, 4247; Bellon *et al.*, 1997, *Nucleosides*
10 & *Nucleotides*, 16, 951; Bellon *et al.*, 1997, *Bioconjugate Chem.* 8, 204).

The nucleic acid molecules of the present invention are modified extensively to enhance stability by modification with nuclease resistant groups, for example, 2'-amino, 2'-C-allyl, 2'-fluoro, 2'-O-methyl, 2'-H (for a review see Usman and Cedergren, 1992, *TIBS* 17, 34; Usman *et al.*, 1994, *Nucleic Acids Symp. Ser.* 31, 163). Ribozymes are purified by
15 gel electrophoresis using general methods or are purified by high pressure liquid chromatography (HPLC; see Wincott *et al.*, *supra*, the totality of which is hereby incorporated herein by reference) and are re-suspended in water.

The sequences of the ribozymes and antisense constructs that are chemically synthesized, useful in this study, are shown in **Tables 3-31, 33, 34, 37-43, 56, 58, 59, 62,**
20 **63.** Those in the art will recognize that these sequences are representative only of many more such sequences where the enzymatic portion of the ribozyme (all but the binding arms) is altered to affect activity. The ribozyme and antisense construct sequences listed in **Tables 3-31, 33, 34, 37-43, 56, 58, 59, 62, 63** may be formed of ribonucleotides or other nucleotides or non-nucleotides. Such ribozymes with enzymatic activity are equivalent to
25 the ribozymes described specifically in the Tables.

Optimizing Activity of the nucleic acid molecule of the invention.

Chemically synthesizing nucleic acid molecules with modifications (base, sugar and/or phosphate) that prevent their degradation by serum ribonucleases may increase their potency (see *e.g.*, Eckstein *et al.*, International Publication No. WO 92/07065; Perrault *et al.*,
30 *1990 Nature* 344, 565; Pieken *et al.*, 1991, *Science* 253, 314; Usman and Cedergren, 1992, *Trends in Biochem. Sci.* 17, 334; Usman *et al.*, International Publication No. WO 93/15187; Rossi *et al.*, International Publication No. WO 91/03162; Sproat, US Patent No.

5,334,711; and Burgin *et al.*, *supra*; all of these describe various chemical modifications that can be made to the base, phosphate and/or sugar moieties of the nucleic acid molecules herein and are all hereby incorporated by reference herein). Modifications which enhance their efficacy in cells, and removal of bases from nucleic acid molecules to shorten oligonucleotide synthesis times and reduce chemical requirements are desired.

There are several examples in the art describing sugar, base and phosphate modifications that can be introduced into nucleic acid molecules (e.g., enzymatic nucleic acid molecules) without significantly effecting catalysis and with significant enhancement in their nuclease stability and efficacy. Enzymatic nucleic acid molecules are modified to enhance stability and/or enhance catalytic activity by modification with nuclease resistant groups, for example, 2'-amino, 2'-C-allyl, 2'-fluoro, 2'-O-methyl, 2'-O-allyl, 2'-H, nucleotide base modifications (for a review see Usman and Cedergren, 1992 *TIBS* 17, 34; Usman *et al.*, 1994 *Nucleic Acids Symp. Ser.* 31, 163; Burgin *et al.*, 1996 *Biochemistry* 35, 14090). Sugar modification of enzymatic nucleic acid molecules have been extensively described in the art (see Eckstein *et al.*, *International Publication* PCT No. WO 92/07065; Perrault *et al.* *Nature* 1990, 344, 565-568; Pieken *et al.* *Science* 1991, 253, 314-317; Usman and Cedergren, *Trends in Biochem. Sci.* 1992, 17, 334-339; Usman *et al.* *International Publication* PCT No. WO 93/15187; Sproat, *US Patent* No. 5,334,711 and Beigelman *et al.*, 1995 *J. Biol. Chem.* 270, 25702; all of the references are hereby incorporated in their totality by reference herein). Such publications describe general methods and strategies to determine the location of incorporation of sugar, base and/or phosphate modifications and the like into enzymatic nucleic acid molecules without inhibiting catalysis, and are incorporated by reference herein. The 2'-position of the sugar in a nucleotide present in the nucleic acid molecules of the instant invention which tolerates substitution is selected from the group comprising -H, -OH, -COOH, -CONH₂, -CONHR¹, -CONR¹R², -NH₂, -NHR¹, -NR¹R², -NHCOR¹, -SH, SR¹, -F, -ONH₂, -ONHR¹, -ONR¹R², -NHOH, -NHOR¹, -NR²OH, -NR²OR¹, substituted or unsubstituted C₁-C₁₀ straight chain or branched alkyl, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkenyl, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkynyl, substituted or unsubstituted C₁-C₁₀ straight chain or branched alkoxy, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkenyloxy, and substituted or unsubstituted C₂-C₁₀ straight chain or branched alkynyloxy. The substituents for sugar 2'

position preferably are independently halogen, cyano, amino, carboxy, ester, ether, carboxamide, hydroxy, or mercapto. R¹ and R² can be substituted or unsubstituted alkyl, alkenyl, or alkynyl groups, where the substituents are independently halogen, cyano, amino, carboxy, ester, ether, carboxamide, hydroxy, or mercapto.

5 In view of such teachings, similar modifications can be used as described herein to modify the nucleic acid molecules of the instant invention. Such publications describe general methods and strategies to determine the location of incorporation of sugar, base and/or phosphate modifications and the like into ribozymes without inhibiting catalysis, and are incorporated by reference herein. In view of such teachings, similar modifications
10 can be used as described herein to modify the nucleic acid molecules of the instant invention.

Some of the non-limiting examples of base modifications that can be introduced into enzymatic nucleic acids without significantly effecting their catalytic activity include, inosine, purine, pyridin-4-one, pyridin-2-one, phenyl, pseudouracil, 2, 4, 6-trimethoxy
15 benzene, 3-methyluracil, dihydrouridine, naphthyl, aminophenyl, 5-alkylcytidines (e.g., 5-methylcytidine), 5-alkyluridines (e.g., ribothymidine), 5-halouridine (e.g., 5-bromouridine) or 6-azapyrimidines or 6-alkylpyrimidines (e.g. 6-methyluridine) and others (Burgin *et al.*, 1996, *Biochemistry*, 35, 14090). By "modified bases" in this aspect is
20 meant nucleotide bases other than adenine, guanine, cytosine and uracil at 1' position or their equivalents; such bases may be used within the catalytic core of the enzyme and/or in the substrate-binding regions.

The nucleic acid bases can be hypoxanthin-9-yl, or a functional equivalent thereof, in position^{15,1} of the ribozyme; the base at other positions may be guanine-9-yl, hypoxanthin-9-yl or 7-deazaguanine-9-yl in positions 5, 8 and 12 in the ribozyme; adenine-9-
25 yl, 2,6-diaminopurine-9-yl, purine-9-yl or 7-deaza adenine-9-yl in positions 6, 9, 13 and 14; uracil-1-yl, uracil-5-yl, thymine-1-yl or 5-propynyluracil-1-yl in position 4; cytosine-1-yl, 5-methylcytosine-1-yl or 5-propynylcytosine-1-yl in position 3; and adenine-9-yl, cytosine-1-yl, guanine-9-yl, uracil-1-yl, uracil-5-yl, hypoxanthine-9-yl, thymine-1-yl, 5-methylcytosine-1-yl, 2,6-diaminopurine-9-yl, purine-9-yl, 7-deaza adenine-9-yl, 7-deazaguanine-9-yl, 5-
30 propynylcytosine-1-yl, 5-propynyluracil-1-yl, isoguanine-9-yl, 2-aminopurine-9-yl, 6-methyluracil-1-yl, 4-thiouracil-1-yl, 2-pyrimidine-1-yl, quinazoline-2,4-dione-1-yl, xanthine-9-yl, N²-dimethylguanine-9-yl, or a functional equivalent thereof in position 7. The

base at position 15.1 is preferably hypoxanthin-9-yl or an analog where no hydrogen bond can form between any group at the 2 position of the base and the 2-oxo group of C^{16.1}. Preferably, B is not guanine-9-yl in position 15.1.

In particular, the invention features modified ribozymes having a base substitution
5 selected from pyridin-4-one, pyridin-2-one, phenyl, pseudouracil, 2, 4, 6-trimethoxy benzene, 3-methyluracil, dihydrouracil, naphthyl, 6-methyl-uracil and aminophenyl.

While chemical modification of oligonucleotide internucleotide linkages with phosphorothioate, phosphorothioate, and/or 5'-methylphosphonate linkages improves stability, too many of these modifications may cause some toxicity. Therefore, when
10 designing nucleic acid molecules, the amount of these internucleotide linkages should be minimized. The reduction in the concentration of these linkages should lower toxicity resulting in increased efficacy and higher specificity of these molecules.

Nucleic acid molecules having chemical modifications which maintain or enhance activity are provided. Such nucleic acid molecules are also generally more resistant to
15 nucleases than unmodified nucleic acid. Thus, in a cell and/or *in vivo* the activity may not be significantly lowered. Therapeutic nucleic acid molecules delivered exogenously must optimally be stable within cells until translation of the target RNA has been inhibited long enough to reduce the levels of the undesirable protein. This period of time varies between hours to days depending upon the disease state. Clearly, nucleic acid molecules must be
20 resistant to nucleases in order to function as effective intracellular therapeutic agents. Improvements in the chemical synthesis of RNA and DNA (Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677; Caruthers *et al.*, 1992, *Methods in Enzymology* 211,3-19 (all are incorporated by reference herein) have expanded the ability to modify nucleic acid molecules by introducing nucleotide modifications to enhance their nuclease stability as
25 described above.

Use of these the nucleic acid-based molecules of the invention will lead to better treatment of the disease progression by affording the possibility of combination therapies (e.g., multiple antisense or enzymatic nucleic acid molecules targeted to different genes, nucleic acid molecules coupled with known small molecule inhibitors, or intermittent
30 treatment with combinations of molecules (including different motifs) and/or other chemical or biological molecules). The treatment of patients with nucleic acid molecules may also include combinations of different types of nucleic acid molecules.

Therapeutic nucleic acid molecules (e.g., enzymatic nucleic acid molecules and antisense nucleic acid molecules) delivered exogenously must optimally be stable within cells until translation of the target RNA has been inhibited long enough to reduce the levels of the undesirable protein. This period of time varies between hours to days depending upon the disease state. Clearly, these nucleic acid molecules must be resistant to nucleases in order to function as effective intracellular therapeutic agents. Improvements in the chemical synthesis of nucleic acid molecules described in the instant invention and in the art have expanded the ability to modify nucleic acid molecules by introducing nucleotide modifications to enhance their nuclease stability as described above.

By "enhanced enzymatic activity" is meant to include activity measured in cells and/or *in vivo* where the activity is a reflection of both catalytic activity and ribozyme stability. In this invention, the product of these properties is increased or not significantly (less than 10-fold) decreased *in vivo* compared to an all RNA ribozyme or all DNA enzyme.

In yet another preferred embodiment, nucleic acid catalysts having chemical modifications which maintain or enhance enzymatic activity are provided. Such nucleic acid catalysts are also generally more resistant to nucleases than unmodified nucleic acid. Thus, in a cell and/or *in vivo* the activity may not be significantly lowered. As exemplified herein such ribozymes are useful in a cell and/or *in vivo* even if activity over all is reduced 10 fold (Burgin *et al.*, 1996, *Biochemistry*, 35, 14090). Such ribozymes herein are said to "maintain" the enzymatic activity of an all RNA ribozyme.

In another aspect the nucleic acid molecules comprise a 5' and/or a 3'-cap structure.

By "cap structure" is meant chemical modifications, which have been incorporated at either terminus of the oligonucleotide (see, for example, Wincott *et al.*, WO 97/26270, incorporated by reference herein). These terminal modifications protect the nucleic acid molecule from exonuclease degradation, and may help in delivery and/or localization within a cell. The cap may be present at the 5'-terminus (5'-cap) or at the 3'-terminal (3'-cap) or may be present on both termini. In non-limiting examples: the 5'-cap is selected from the group comprising inverted abasic residue (moiety); 4',5'-methylene nucleotide; 1-(beta-D-erythrofuransyl) nucleotide, 4'-thio nucleotide; carbocyclic nucleotide; 1,5-

- anhydrohexitol nucleotide; L-nucleotides; alpha-nucleotides; modified base nucleotide; phosphorodithioate linkage; *threo*-pentofuranosyl nucleotide; acyclic 3',4'-seco nucleotide; acyclic 3,4-dihydroxybutyl nucleotide; acyclic 3,5-dihydroxypentyl nucleotide, 3'-3'-inverted nucleotide moiety; 3'-3'-inverted abasic moiety; 3'-2'-inverted nucleotide moiety; 5 3'-2'-inverted abasic moiety; 1,4-butanediol phosphate; 3'-phosphoramidate; hexylphosphate; aminohexyl phosphate; 3'-phosphate; 3'-phosphorothioate; phosphorodithioate; or bridging or non-bridging methylphosphonate moiety (for more details, see Wincott *et al.*, International PCT publication No. WO 97/26270, incorporated by reference herein).
- 10 In yet another preferred embodiment, the 3'-cap is selected from a group comprising, 4',5'-methylene nucleotide; 1-(beta-D-erythrofuransyl) nucleotide; 4'-thio nucleotide, carbocyclic nucleotide; 5'-amino-alkyl phosphate; 1,3-diamino-2-propyl phosphate; 3-aminopropyl phosphate; 6-aminohexyl phosphate; 1,2-aminododecyl phosphate; hydroxypropyl phosphate; 1,5-anhydrohexitol nucleotide; L-nucleotide; alpha-
- 15 nucleotide; modified base nucleotide; phosphorodithioate; *threo*-pentofuranosyl nucleotide; acyclic 3',4'-seco nucleotide; 3,4-dihydroxybutyl nucleotide; 3,5-dihydroxypentyl nucleotide, 5'-5'-inverted nucleotide moiety; 5'-5'-inverted abasic moiety; 5'-phosphoramidate; 5'-phosphorothioate; 1,4-butanediol phosphate; 5'-amino; bridging and/or non-bridging 5'-phosphoramidate, phosphorothioate and/or phosphorodithioate,
- 20 bridging or non bridging methylphosphonate and 5'-mercapto moieties (for more details see Beaucage and Iyer, 1993, *Tetrahedron* 49, 1925; incorporated by reference herein).
- An "alkyl" group refers to a saturated aliphatic hydrocarbon, including straight-chain, branched-chain, and cyclic alkyl groups. Preferably, the alkyl group has 1 to 12 carbons. More preferably it is a lower alkyl of from 1 to 7 carbons, more preferably 1 to 4
- 25 carbons. The alkyl group may be substituted or unsubstituted. When substituted the substituted group(s) is preferably, hydroxyl, cyano, alkoxy, =O, =S, NO₂ or N(CH₃)₂, amino, or SH. The term also includes alkenyl groups which are unsaturated hydrocarbon groups containing at least one carbon-carbon double bond, including straight-chain, branched-chain, and cyclic groups. Preferably, the alkenyl group has 1 to 12 carbons.
- 30 More preferably it is a lower alkenyl of from 1 to 7 carbons, more preferably 1 to 4 carbons. The alkenyl group may be substituted or unsubstituted. When substituted the

substituted group(s) is preferably, hydroxyl, cyano, alkoxy, =O, =S, NO₂, halogen, N(CH₃)₂, amino, or SH. The term "alkyl" also includes alkynyl groups which have an unsaturated hydrocarbon group containing at least one carbon-carbon triple bond, including straight-chain, branched-chain, and cyclic groups. Preferably, the alkynyl group has 1 to 12 carbons. More preferably it is a lower alkynyl of from 1 to 7 carbons, more preferably 1 to 4 carbons. The alkynyl group may be substituted or unsubstituted. When substituted the substituted group(s) is preferably, hydroxyl, cyano, alkoxy, =O, =S, NO₂ or N(CH₃)₂, amino or SH.

Such alkyl groups may also include aryl, alkylaryl, carbocyclic aryl, heterocyclic aryl, amide and ester groups. An "aryl" group refers to an aromatic group which has at least one ring having a conjugated pi electron system and includes carbocyclic aryl, heterocyclic aryl and biaryl groups, all of which may be optionally substituted. The preferred substituent(s) of aryl groups are halogen, trihalomethyl, hydroxyl, SH, OH, cyano, alkoxy, alkyl, alkenyl, alkynyl, and amino groups. An "alkylaryl" group refers to an alkyl group (as described above) covalently joined to an aryl group (as described above). Carbocyclic aryl groups are groups wherein the ring atoms on the aromatic ring are all carbon atoms. The carbon atoms are optionally substituted. Heterocyclic aryl groups are groups having from 1 to 3 heteroatoms as ring atoms in the aromatic ring and the remainder of the ring atoms are carbon atoms. Suitable heteroatoms include oxygen, sulfur, and nitrogen, and include furanyl, thienyl, pyridyl, pyrrolyl, N-lower alkyl pyrrolo, pyrimidyl, pyrazinyl, imidazolyl and the like, all optionally substituted. An "amide" refers to an -C(O)-NH-R, where R is either alkyl, aryl, alkylaryl or hydrogen. An "ester" refers to an -C(O)-OR', where R is either alkyl, aryl, alkylaryl or hydrogen.

By "nucleotide" as used herein is as recognized in the art to include natural bases (standard), and modified bases well known in the art. Such bases are generally located at the 1' position of a nucleotide sugar moiety. Nucleotides generally comprise a base, sugar and a phosphate group. The nucleotides can be unmodified or modified at the sugar, phosphate and/or base moiety, (also referred to interchangeably as nucleotide analogs, modified nucleotides, non-natural nucleotides, non-standard nucleotides and other; see, for example, Usman and McSwiggen, *supra*; Eckstein *et al.*, International PCT Publication No. WO 92/07065; Usman *et al.*, International PCT Publication No. WO 93/15187;

Uhlman & Peyman, *supra*, all are hereby incorporated by reference herein). There are several examples of modified nucleic acid bases known in the art as summarized by Limbach *et al.*, 1994, *Nucleic Acids Res.* 22, 2183. Some of the non-limiting examples of base modifications that can be introduced into nucleic acid molecules include, inosine,

- 5 purine, pyridin-4-one, pyridin-2-one, phenyl, pseudouracil, 2, 4, 6-trimethoxy benzene, 3-methyl uracil, dihydrouridine, naphthyl, aminophenyl, 5-alkylcytidines (*e.g.*, 5-methylcytidine), 5-alkyluridines (*e.g.*, ribothymidine), 5-halouridine (*e.g.*, 5-bromouridine) or 6-azapyrimidines or 6-alkylpyrimidines (*e.g.* 6-methyluridine), propyne, and others (Burgin *et al.*, 1996, *Biochemistry*, 35, 14090; Uhlman & Peyman, 10 *supra*).

- By "modified bases" in this aspect is meant nucleotide bases other than adenine, guanine, cytosine and uracil at 1' position or their equivalents; such bases may be used at any position, for example, within the catalytic core of an enzymatic nucleic acid molecule and/or in the substrate-binding regions of the nucleic acid molecule. Such modified 15 nucleotides include dideoxynucleotides which have pharmaceutical utility well known in the art, as well as utility in basic molecular biology methods such as sequencing.

- In a preferred embodiment, the invention features modified ribozymes with phosphate backbone modifications comprising one or more phosphorothioate, phosphorodithioate, methylphosphonate, morpholino, amidate carbamate, carboxymethyl, 20 acetamidate, polyamide, sulfonate, sulfonamide, sulfamate, formacetal, thioformacetal, and/or alkylsilyl, substitutions. For a review of oligonucleotide backbone modifications, see Hunziker and Leumann, 1995, *Nucleic Acid Analogues: Synthesis and Properties*, in *Modern Synthetic Methods*, VCH, 331-417, and Mesmaeker *et al.*, 1994, *Novel Backbone Replacements for Oligonucleotides*, in *Carbohydrate Modifications in Antisense Research*, 25 ACS, 24-39. These references are hereby incorporated by reference herein.

By "abasic" is meant sugar moieties lacking a base or having other chemical groups in place of a base at the 1' position, (for more details, see Wincott *et al.*, International PCT publication No. WO 97/26270).

- By "unmodified nucleoside" or "unmodified nucleotide" is meant one of the bases 30 adenine, cytosine, guanine, thymine, uracil joined to the 1' carbon of β -D-ribo-furanose.

By "modified nucleoside" or "modified nucleotide" is meant any nucleotide base which contains a modification in the chemical structure of an unmodified nucleotide base, sugar and/or phosphate.

In connection with 2'-modified nucleotides as described for the present invention, 5 by "amino" is meant 2'-NH₂ or 2'-O- NH₂, which may be modified or unmodified. Such modified groups are described, for example, in Eckstein et al., U.S. Patent 5,672,695 and Matulic-Adamic et al., WO 98/28317, which are both incorporated by reference in their entireties.

Various modifications to nucleic acid (e.g., antisense and ribozyme) structure can be 10 made to enhance the utility of these molecules. Such modifications will enhance shelf-life, half-life *in vitro*, stability, and ease of introduction of such oligonucleotides to the target site, e.g., to enhance penetration of cellular membranes, and confer the ability to recognize and bind to targeted cells.

Use of these molecules will lead to better treatment of the disease progression by 15 affording the possibility of combination therapies (e.g., multiple ribozymes targeted to different genes, ribozymes coupled with known small molecule inhibitors, or intermittent treatment with combinations of ribozymes (including different ribozyme motifs) and/or other chemical or biological molecules). The treatment of patients with nucleic acid molecules may also include combinations of different types of nucleic acid molecules. 20 Therapies may be devised which include a mixture of ribozymes (including different ribozyme motifs), antisense and/or 2-5A chimera molecules to one or more targets to alleviate symptoms of a disease.

Administration of Nucleic Acid Molecules

25 Methods for the delivery of nucleic acid molecules are described in Akhtar *et al.*, 1992, *Trends Cell Bio.*, 2, 139; and *Delivery Strategies for Antisense Oligonucleotide Therapeutics*, ed. Akhtar, 1995 which are both incorporated herein by reference. Sullivan *et al.*, PCT WO 94/02595, further describes the general methods for delivery of enzymatic RNA molecules. These protocols may be utilized for the delivery of virtually any nucleic 30 acid molecule. Nucleic acid molecules may be administered to cells by a variety of methods known to those familiar to the art, including, but not restricted to, encapsulation in liposomes, by iontophoresis, or by incorporation into other vehicles, such as hydrogels,

- cyclodextrins, biodegradable nanocapsules, and bioadhesive microspheres. For some indications, nucleic acid molecules may be directly delivered *ex vivo* to cells or tissues with or without the aforementioned vehicles. Alternatively, the nucleic acid/vehicle combination is locally delivered by direct injection or by use of a catheter, infusion pump or stent. Many examples in the art describe CNS delivery methods of oligonucleotides by osmotic pump, (see Chun *et al.*, 1998, *Neuroscience Letters*, 257, 135-138, D'Aldin *et al.*, 1998, *Mol. Brain Research*, 55, 151-164, Dryden *et al.*, 1998, *J. Endocrinol.*, 157, 169-175, Ghimikar *et al.*, 1998, *Neuroscience Letters*, 247, 21-24) or direct infusion (Broadus *et al.*, 1997, *Neurosurg. Focus*, 3, article 4). Other routes of delivery include, but are not limited to oral (tablet or pill form) and/or intrathecal delivery (Gold, 1997, *Neuroscience*, 76, 1153-1158). For a comprehensive review on drug delivery strategies including broad coverage of CNS delivery, see Jain, *Drug Delivery Systems: Technologies and Commercial Opportunities*, Decision Resources, 1998. Other routes of delivery include, but are not limited to, intravascular, intramuscular, subcutaneous or joint injection, aerosol inhalation, oral (tablet or pill form), topical, systemic, ocular, intraperitoneal and/or intrathecal delivery. More detailed descriptions of nucleic acid delivery and administration are provided in Sullivan *et al.*, *supra*, Draper *et al.*, PCT WO93/23569; Beigelman *et al.*, PCT WO99/05094, and Klimuk *et al.*, PCT WO99/04819 all of which are incorporated by reference herein.
- The molecules of the instant invention can be used as pharmaceutical agents. Pharmaceutical agents prevent, inhibit the occurrence, or treat (alleviate a symptom to some extent, preferably all of the symptoms) of a disease state in a patient.
- The negatively charged polynucleotides of the invention can be administered (*e.g.*, RNA, DNA or protein) and introduced into a patient by any standard means, with or without stabilizers, buffers, and the like, to form a pharmaceutical composition. When it is desired to use a liposome delivery mechanism, standard protocols for formation of liposomes can be followed. The compositions of the present invention may also be formulated and used as tablets, capsules or elixirs for oral administration; suppositories for rectal administration; sterile solutions; suspensions for injectable administration; and the other compositions known in the art.

The present invention also includes pharmaceutically acceptable formulations of the compounds described. These formulations include salts of the above compounds, *e.g.*, acid addition salts, for example, salts of hydrochloric, hydrobromic, acetic acid, and benzene sulfonic acid.

5 A pharmacological composition or formulation refers to a composition or formulation in a form suitable for administration, *e.g.*, systemic administration, into a cell or patient, preferably a human. Suitable forms, in part, depend upon the use or the route of entry, for example, oral, transdermal, or by injection. Such forms should not prevent the composition or formulation from reaching a target cell (*i.e.*, a cell to which the negatively
10 charged polymer is desired to be delivered to). For example, pharmacological compositions injected into the blood stream should be soluble. Other factors are known in the art, and include considerations such as toxicity and forms which prevent the composition or formulation from exerting its effect.

By "systemic administration" is meant *in vivo* systemic absorption or accumulation
15 of drugs in the blood stream followed by distribution throughout the entire body. Administration routes which lead to systemic absorption include, without limitations: intravenous, subcutaneous, intraperitoneal, inhalation, oral, intrapulmonary and intramuscular. Each of these administration routes expose the desired negatively charged
20 polymers, *e.g.*, nucleic acids, to an accessible diseased tissue. The rate of entry of a drug into the circulation has been shown to be a function of molecular weight or size. The use of a liposome or other drug carrier comprising the compounds of the instant invention can potentially localize the drug, for example, in certain tissue types, such as the tissues of the reticular endothelial system (RES). A liposome formulation which can facilitate the
25 association of drug with the surface of cells, such as, lymphocytes and macrophages is also useful. This approach may provide enhanced delivery of the drug to target cells by taking advantage of the specificity of macrophage and lymphocyte immune recognition of abnormal cells, such as cancer cells.

By pharmaceutically acceptable formulation is meant, a composition or formulation that allows for the effective distribution of the nucleic acid molecules of the instant
30 invention in the physical location most suitable for their desired activity. Nonlimiting examples of agents suitable for formulation with the nucleic acid molecules of the instant invention include: P-glycoprotein inhibitors (such as Pluronic P85) which can enhance

- entry of drugs into the CNS (Jolliet-Riant and Tillement, 1999, *Fundam. Clin. Pharmacol.*, 13, 16-26); biodegradable polymers, such as poly (DL-lactide-coglycolide) microspheres for sustained release delivery after intracerebral implantation (Emerich, DF *et al.*, 1999, *Cell Transplant*, 8, 47-58) Alkermes, Inc. Cambridge, MA; and loaded nanoparticles, such as those made of polybutylcyanoacrylate, which can deliver drugs across the blood brain barrier and can alter neuronal uptake mechanisms (*Prog Neuropsychopharmacol Biol Psychiatry*, 23, 941-949, 1999). Other non-limiting examples of delivery strategies for the nucleic acid molecules of the instant invention include material described in Boado *et al.*, 1998, *J. Pharm. Sci.*, 87, 1308-1315; Tyler *et al.*, 1999, *FEBS Lett.*, 421, 280-284;
- 5 as those made of polybutylcyanoacrylate, which can deliver drugs across the blood brain barrier and can alter neuronal uptake mechanisms (*Prog Neuropsychopharmacol Biol Psychiatry*, 23, 941-949, 1999). Other non-limiting examples of delivery strategies for the nucleic acid molecules of the instant invention include material described in Boado *et al.*, 1998, *J. Pharm. Sci.*, 87, 1308-1315; Tyler *et al.*, 1999, *FEBS Lett.*, 421, 280-284;
- 10 Pardridge *et al.*, 1995, *PNAS USA.*, 92, 5592-5596; Boado, 1995, *Adv. Drug Delivery Rev.*, 15, 73-107; Aldrian-Herrada *et al.*, 1998, *Nucleic Acids Res.*, 26, 4910-4916; and Tyler *et al.*, 1999, *PNAS USA.*, 96, 7053-7058.

- The invention also features the use of the composition comprising surface-modified liposomes containing poly (ethylene glycol) lipids (PEG-modified, or long-circulating liposomes or stealth liposomes). These formulations offer a method for increasing the accumulation of drugs in target tissues. This class of drug carriers resists opsonization and elimination by the mononuclear phagocytic system (MPS or RES), thereby enabling longer blood circulation times and enhanced tissue exposure for the encapsulated drug (Lasic *et al. Chem. Rev.* 1995, 95, 2601-2627; Ishiwata *et al.*, *Chem. Pharm. Bull.* 1995, 43, 1005-
- 15 liposomes or stealth liposomes). These formulations offer a method for increasing the accumulation of drugs in target tissues. This class of drug carriers resists opsonization and elimination by the mononuclear phagocytic system (MPS or RES), thereby enabling longer blood circulation times and enhanced tissue exposure for the encapsulated drug (Lasic *et al. Chem. Rev.* 1995, 95, 2601-2627; Ishiwata *et al.*, *Chem. Pharm. Bull.* 1995, 43, 1005-
- 20 1011). Such liposomes have been shown to accumulate selectively in tumors, presumably by extravasation and capture in the neovascularized target tissues (Lasic *et al.*, *Science* 1995, 267, 1275-1276; Oku *et al.*, 1995, *Biochim. Biophys. Acta*, 1238, 86-90). The long-circulating liposomes enhance the pharmacokinetics and pharmacodynamics of DNA and RNA, particularly compared to conventional cationic liposomes which are known to
- 25 accumulate in tissues of the MPS (Liu *et al.*, *J. Biol. Chem.* 1995, 42, 24864-24870; Choi *et al.*, International PCT Publication No. WO 96/10391; Ansell *et al.*, International PCT Publication No. WO 96/10390; Holland *et al.*, International PCT Publication No. WO 96/10392; all of which are incorporated herein by reference). Long-circulating liposomes are also likely to protect drugs from nuclease degradation to a greater extent compared to
- 30 cationic liposomes, based on their ability to avoid accumulation in metabolically aggressive MPS tissues such as the liver and spleen.

The present invention also includes compositions prepared for storage or administration which include a pharmaceutically effective amount of the desired compounds in a pharmaceutically acceptable carrier or diluent. Acceptable carriers or diluents for therapeutic use are well known in the pharmaceutical art, and are described, for example, in *Remington's Pharmaceutical Sciences*, Mack Publishing Co. (A.R. Gennaro edit. 1985) hereby incorporated by reference herein. For example, preservatives, stabilizers, dyes and flavoring agents may be provided. These include sodium benzoate, sorbic acid and esters of *p*-hydroxybenzoic acid. In addition, antioxidants and suspending agents may be used.

A pharmaceutically effective dose is that dose required to prevent, inhibit the occurrence, or treat (alleviate a symptom to some extent, preferably all of the symptoms) of a disease state. The pharmaceutically effective dose depends on the type of disease, the composition used, the route of administration, the type of mammal being treated, the physical characteristics of the specific mammal under consideration, concurrent medication, and other factors which those skilled in the medical arts will recognize. Generally, an amount between 0.1 mg/kg and 100 mg/kg body weight/day of active ingredients is administered dependent upon potency of the negatively charged polymer.

The nucleic acid molecules of the present invention may also be administered to a patient in combination with other therapeutic compounds to increase the overall therapeutic effect. The use of multiple compounds to treat an indication may increase the beneficial effects while reducing the presence of side effects.

Alternatively, certain of the nucleic acid molecules of the instant invention can be expressed within cells from eukaryotic promoters (e.g., Izant and Weintraub, 1985, *Science*, 229, 345; McGarry and Lindquist, 1986, *Proc. Natl. Acad. Sci.*, USA 83, 399; Scanlon *et al.*, 1991, *Proc. Natl. Acad. Sci. USA*, 88, 10591-5; Kashani-Sabet *et al.*, 1992, *Antisense Res. Dev.*, 2, 3-15; Dropulic *et al.*, 1992, *J. Virol.*, 66, 1432-41; Weerasinghe *et al.*, 1991, *J. Virol.*, 65, 5531-4; Ojwang *et al.*, 1992, *Proc. Natl. Acad. Sci. USA*, 89, 10802-6; Chen *et al.*, 1992, *Nucleic Acids Res.*, 20, 4581-9; Sarver *et al.*, 1990 *Science*, 247, 1222-1225; Thompson *et al.*, 1995, *Nucleic Acids Res.*, 23, 2259; Good *et al.*, 1997, *Gene Therapy*, 4, 45; all of these references are hereby incorporated herein, in their totalities, by reference). Those skilled in the art realize that any nucleic acid can be expressed in eukaryotic cells from the appropriate DNA/RNA vector. The activity of such

nucleic acids can be augmented by their release from the primary transcript by a ribozyme (Draper *et al.*, PCT WO 93/23569, and Sullivan *et al.*, PCT WO 94/02595; Ohkawa *et al.*, 1992, *Nucleic Acids Symp. Ser.*, 27, 15-6; Taira *et al.*, 1991, *Nucleic Acids Res.*, 19, 5125-30; Ventura *et al.*, 1993, *Nucleic Acids Res.*, 21, 3249-55; Chowrira *et al.*, 1994, *J. Biol.*

- 5 Chem., 269, 25856; all of these references are hereby incorporated in their totality by reference herein).

In another aspect of the invention, RNA molecules of the present invention are preferably expressed from transcription units (see, for example, Couture *et al.*, 1996, *TIG.*, 12, 510) inserted into DNA or RNA vectors. The recombinant vectors are preferably DNA
10 plasmids or viral vectors. Ribozyme expressing viral vectors could be constructed based on, but not limited to, adeno-associated virus, retrovirus, adenovirus, or alphavirus. Preferably, the recombinant vectors capable of expressing the nucleic acid molecules are delivered as described above, and persist in target cells. Alternatively, viral vectors may be used that provide for transient expression of nucleic acid molecules. Such vectors
15 might be repeatedly administered as necessary. Once expressed, the nucleic acid molecule binds to the target mRNA. Delivery of nucleic acid molecule expressing vectors could be systemic, such as by intravenous or intra-muscular administration, by administration to target cells ex-planted from the patient followed by reintroduction into the patient, or by any other means that would allow for introduction into the desired target cell (for a review
20 see Couture *et al.*, 1996, *TIG.*, 12, 510).

In one aspect, the invention features an expression vector comprising a nucleic acid sequence encoding at least one of the nucleic acid molecules of the instant invention is disclosed. The nucleic acid sequence encoding the nucleic acid molecule of the instant invention is operably linked in a manner which allows expression of that nucleic acid
25 molecule.

In another aspect the invention features an expression vector comprising: a) a transcription initiation region (*e.g.*, eukaryotic pol I, II or III initiation region); b) a transcription termination region (*e.g.*, eukaryotic pol I, II or III termination region); c) a nucleic acid sequence encoding at least one of the nucleic acid catalyst of the instant
30 invention; and wherein said sequence is operably linked to said initiation region and said termination region, in a manner which allows expression and/or delivery of said nucleic acid molecule. The vector may optionally include an open reading frame (ORF) for a

protein operably linked on the 5' side or the 3'-side of the sequence encoding the nucleic acid catalyst of the invention; and/or an intron (intervening sequences).

- Transcription of the nucleic acid molecule sequences are driven from a promoter for eukaryotic RNA polymerase I (pol I), RNA polymerase II (pol II), or RNA polymerase III (pol III). Transcripts from pol II or pol III promoters will be expressed at high levels in all cells; the levels of a given pol II promoter in a given cell type will depend on the nature of the gene regulatory sequences (enhancers, silencers, etc.) present nearby. Prokaryotic RNA polymerase promoters are also used, providing that the prokaryotic RNA polymerase enzyme is expressed in the appropriate cells (Elroy-Stein and Moss, 1990, *Proc. Natl. Acad. Sci. U S A*, 87, 6743-7; Gao and Huang 1993, *Nucleic Acids Res.*, 21, 2867-72; Lieber et al., 1993, *Methods Enzymol.*, 217, 47-66; Zhou et al., 1990, *Mol. Cell. Biol.*, 10, 4529-37). All of these references are incorporated by reference herein. Several investigators have demonstrated that nucleic acid molecules, such as ribozymes expressed from such promoters can function in mammalian cells (e.g. Kashani-Sabet et al., 1992, *Antisense Res. Dev.*, 2, 3-15; Ojwang et al., 1992, *Proc. Natl. Acad. Sci. U S A*, 89, 10802-6; Chen et al., 1992, *Nucleic Acids Res.*, 20, 4581-9; Yu et al., 1993, *Proc. Natl. Acad. Sci. U S A*, 90, 6340-4; L'Huillier et al., 1992, *EMBO J.*, 11, 4411-8; Lisiewicz et al., 1993, *Proc. Natl. Acad. Sci. U. S. A*, 90, 8000-4; Thompson et al., 1995, *Nucleic Acids Res.*, 23, 2259; Sullenger & Cech, 1993, *Science*, 262, 1566). More specifically, transcription units such as the ones derived from genes encoding U6 small nuclear (snRNA), transfer RNA (tRNA) and adenovirus VA RNA are useful in generating high concentrations of desired RNA molecules such as ribozymes in cells (Thompson et al., *supra*; Couture and Stinchcomb, 1996, *supra*; Noonberg et al., 1994, *Nucleic Acid Res.*, 22, 2830; Noonberg et al., US Patent No. 5,624,803; Good et al., 1997, *Gene Ther.*, 4, 45; Beigelman et al., International PCT Publication No. WO 96/18736; all of these publications are incorporated by reference herein. The above ribozyme transcription units can be incorporated into a variety of vectors for introduction into mammalian cells, including but not restricted to, plasmid DNA vectors, viral DNA vectors (such as adenovirus or adeno-associated virus vectors), or viral RNA vectors (such as retroviral or alphavirus vectors) (for a review see Couture and Stinchcomb, 1996, *supra*).

In yet another aspect, the invention features an expression vector comprising nucleic acid sequence encoding at least one of the nucleic acid molecules of the invention, in a manner which allows expression of that nucleic acid molecule. The expression vector comprises in one embodiment; a) a transcription initiation region; b) a transcription termination region; c) a nucleic acid sequence encoding at least one said nucleic acid molecule; and wherein said sequence is operably linked to said initiation region and said termination region, in a manner which allows expression and/or delivery of said nucleic acid molecule. In another preferred embodiment the expression vector comprises: a) a transcription initiation region; b) a transcription termination region; c) an open reading frame; d) a nucleic acid sequence encoding at least one said nucleic acid molecule, wherein said sequence is operably linked to the 3'-end of said open reading frame; and wherein said sequence is operably linked to said initiation region, said open reading frame and said termination region, in a manner which allows expression and/or delivery of said nucleic acid molecule. In yet another embodiment, the expression vector comprises: a) a transcription initiation region; b) a transcription termination region; c) an intron; d) a nucleic acid sequence encoding at least one said nucleic acid molecule; and wherein said sequence is operably linked to said initiation region, said intron and said termination region, in a manner which allows expression and/or delivery of said nucleic acid molecule. In another embodiment, the expression vector comprises: a) a transcription initiation region; b) a transcription termination region; c) an intron; d) an open reading frame; e) a nucleic acid sequence encoding at least one said nucleic acid molecule, wherein said sequence is operably linked to the 3'-end of said open reading frame; and wherein said sequence is operably linked to said initiation region, said intron, said open reading frame and said termination region, in a manner which allows expression and/or delivery of said nucleic acid molecule.

Examples:

The following are non-limiting examples showing the selection, isolation, synthesis and activity of nucleic acids of the instant invention.

Example 1: Telomerase

The ribonucleoprotein enzyme telomerase consists of an RNA template subunit and one or more protein subunits including telomerase reverse transcriptase (TERT), which function together to direct the synthesis of telomeres. Telomeres exist as non-nucleosome DNA/protein complexes at the physical ends of eukaryotic chromosomes. These capping structures maintain chromosome stability and replicative potential (Zakian, V. A., 1995, Science, 270, 1601-1607). Telomere structure is characterized by tandem repeats of conserved DNA sequences rich in G-C base pairs. Additional conserved telomere elements include a terminal 3'-overhang in the G-rich strand and non-histone structural proteins that are complexed with telomeric DNA in the nucleus. (Blackburn, "E., 1990, JBC., 265, 5919-5921.). Observed shortening of telomeres coincides with the onset of cellular senescence in most somatic cell lines lacking significant levels of telomerase. This finding has had a profound impact on our views concerning the mechanisms of aging, age related disease, and cancer.

Conventional DNA polymerases are unable to fully replicate the ends of linear chromosomes (Watson, J. D., 1972, Nature, 239, 197-201). This inability stems from the 3' G-rich overhang that is a product of ribonuclease cleavage of the RNA primer used in DNA replication. The overhang prevents DNA polymerase replication since the recessed C-rich parent strand cannot be used as a template. Telomerase overcomes this limitation by extending the 3' end of the chromosome using deoxyribonucleotides as substrates and a sequence within the telomerase RNA subunit as a template. (Lingner, J., 1995, Science, 269, 1533-1534). As such, telomerase is considered a reverse transcriptase that is responsible for telomere maintenance.

Telomerase was first discovered by in *Tetrahymena thermophila* in 1985 (Greider, C. W., 1995, Cell, 43, 405-413). The RNA subunits and their respective genes were later discovered and characterized in protozoa, budding yeast, and mammals. Genetic studies of these genes confirmed the role of telomerase RNA (TR) in determining telomere sequence by mutating genes which encode the telomeric RNA (Yu, G. L., 1990, Nature, 344, 126-132), (Singer, M. S., 1994, Science, 266, 404-409), (Blasco, M. A., 1995, Science, 269, 1267-1270). These studies showed that telomerase activity parallels TR expression in protozoa, yeast and mice. However, the expression of human telomerase RNA (hTR) does not correlate well with telomerase activity in mammalian cells. Many

human tissues express hTR but are devoid of telomerase activity (Feng, J., 1995, Science, 269, 1236-1241). Knockout mice, in which the mTR gene has been deleted from germline cells, have been shown to be viable for at least six generations. Cells from later generations of these mice showed chromosomal abnormalities consistent with telomere degradation, indicating that mTR is necessary for telomere length maintenance, but is not required for embryonic development, oncogenic transformation, or tumor formation in mice (Blasco, M. A., 1997, Cell, 91, 25-34).

- The first catalytically active subunit of telomerase (p123) was isolated from *Euplotes aediculatus* along with another subunit (p43) and a 66-kD RNA subunit (Linger, J., 1996, Proc. Natl. Acad. Sci., 93, 10712-10717). Subsequent studies revealed telomerase catalytic subunit homologs from fission yeast (Est2p) and human genes (TRT1). The human homolog, TRT1 encoding hTERT, expressed mRNA with a strong correlation to telomerase activity in human cells (Nakamura, T. M., 1997, Science, 277, 955-959). Reconstitution of telomerase activity with *in vitro* transcribed and translated hTERT and hTR, either co-synthesized or simply mixed, demonstrated that hTERT and hTR represent the minimal components of telomerase. Furthermore, transient expression of hTERT in normal diploid human cells restored telomerase activity, demonstrating that hTERT is the only component necessary to restore telomerase activity in normal human cells (Weinrich, S. L., 1997, Nature Genetics, 17, 498-502). The introduction of telomerase into normal human cells using hTERT expression via transfection has resulted in the extension of life span in these cells. Such findings indicate that telomere loss in the absence of telomerase is the "mitotic clock" that controls the replicative potential of a cell prior to senescence (Bodnar, A. G., 1998, Science, 279, 349-352).

- Expression of telomerase is observed in germ cell and most cancer cell lines. These "immortal" cell lines continue to divide without shortening of their telomeres (Kim, N. W., 1994, Science, 266, 2011-2015). A model of tumor progression has evolved from these findings, suggesting a role for telomerase expression in malignant transformation. Successful malignant transformation in human cells was accomplished for the first time by ectopic expression of hTERT in combination with two oncogenes, SV40 large-T and H-ras. Injection of nude mice with cells expressing these oncogenes and hTERT resulted in rapid growth of tumors. These observations indicate that hTERT mediated telomere

maintenance is essential for the formation of human tumor cells (Hahn, W. C., 1999, Nature, 400, 464-468).

Various methods have been developed to assay telomerase activity *in vitro*. The most widely used method to characterize telomerase activity is the telomeric repeat amplification protocol (TRAP). TRAP utilizes RT-PCR of cellular extracts to measure telomerase activity by making the amount of PCR target dependant upon the biochemical activity of the enzyme (Kim, N. W., 1997, Nucleic Acids Research, 25, 2595-2597, which is incorporated by reference herein).

A method based on Kim is as follows. Briefly, for the telomerase assay, 2 µg of protein extract is used. The extract is assayed in 50 µl of reaction mixture containing 0.1 µg TS substrate primer (5'-AATCCGTCGAGCAGAGTT-3', end-labeled using alpha-³²P-ATP and T4 polynucleotide kinase), 0.1 µg ACX return primer (5'-GCGCGG[CTTACC]₃CTAACC-3'), 0.1 µg NT internal control primer (5'-ATCGCTTCTCGGCCTTT-3'), 0.01 micromol TSNT internal control template (5'-

AATCCGTCGAGCAGAGTTAAAAGGCCGAGAACGAT-3'), 50 µM each deoxynucleoside triphosphate, 2 U of Taq DNA polymerase, and 2 µl CHAPS protein extract, all in 1X TRAP buffer (20 mM Tris (pH 8.3), 68 mM KCl, 1.5 mM MgCl₂, 1 mM EGTA, 0.05% Tween 20). Each reaction is placed in a thermocycler block preheated to 30 C and incubated at 30 C for 10 minutes, then cycled for 27 cycles of 94 degrees C for 30 seconds, 60 degrees C for 30 seconds. Reaction products are separated on a denaturing 8% polyacrylamide gel, followed by drying of the gel and autoradiography. The internal control (to control for possible Taq polymerase inhibition) generates a band of 36 nt. Comparison of radioactive signal integrated (e.g., by phosphorimager analysis) for telomerase-extended bands with the radioactive signal from a reaction performed with a known amount of quantification standard template (termed R8; 5'-AATCCGTCGAGCAGAGTTAG [GGTTAG]₇₋₃) allows expression of telomerase activity as an absolute value. The absolute value = $\text{TPG (total product generated)} = \frac{(\text{TP} - \text{TPi})/\text{TI}}{[(\text{R8-B})/\text{RI}]} \times 100$, where TP = telomerase products from test extract, TPi = telomerase products from a heat-inactivated (75 C, 10 minutes) extract reaction, TI = the signal from the internal control, R8 = the signal from the R8 qualification standard template reaction, B = signal from a lysis buffer-only blank reaction, and RI = the internal control value for the reaction containing R8 template and NT and TSNT control primers.

TPG values of 0-10,000 are possible, with the linear range being from approximately 1 to 1000 TPG. The range of 1 to 1000 TPG encompasses the minimum and maximum levels of telomerase activity in most tumor samples tested, while non-tumor cells most often have no telomerase activity (TPG approximately zero).

- 5 Telomerase activity may also be assayed as follows. Samples to be assayed for telomerase activity are prepared by extraction into CHAPS lysis buffer (10mM Tris pH 7.5, 1mM MgCl₂, 1mM EGTA, 0.1 mM PMSF, 5mM -mercaptoethanol, 1mM DTT, 0.5% 3-[(3-cholamidopropyl)-dimethyl-amino]-1- propanesulfonate (CHAPS), 10% glycerol and 40 U/ml RNase inhibitor (Promega, Madison, WI, U.S.A.). Cells are
- 10 suspended in CHAPS lysis buffer and incubated on ice for 30 minutes, which allows lysis of 90-100% of cells. Lysate is then transferred to polyallomer centrifuge tubes and spun at 100,000 x g for 1 hour at 4 degrees C. The supernatant is the protein extract, and concentration ranges of 4-10 µg/µl are suitable for telomerase assay. Extracts may be concentrated if necessary using a Microcon Microfilter 30 (Amicon, Beverly, MA U.S.A.)
- 15 according to the manufacturer's instructions. Extracts may be stored frozen at -80 degrees C until assayed.

- A variety of animal models have been designed to assay telomerase activity *in vivo*. Inhibition of telomerase activity has been analyzed in rats via cell proliferation studies with MNU (N-methyl-N-nitrosurea) induced mammary carcinomas in response to treatment
- 20 with 4-(hydroxyphenyl)retinamide (4-HPR), a known inhibitor of mammary carcinogenesis in animal models and premenopausal women (Bednarek, A., 1999, Carcinogenesis, 20, 879-883). Additional studies have focused on the up-regulation of telomerase in transformed cell lines from animal and human model systems (Zhang, P. B., 1998, Leuk. Res., 22, 509-516), (Chadeneau, C., 1995, Oncogene, 11, 893-898),
- 25 (Greenberg, R., 1999, Oncogene, 18, 1219-1226).

- Human cell culture studies have been established to assay inhibition of telomerase activity in human carcinomas responding to various therapeutics. A human breast cancer model for studying telomerase inhibitors is described (Raymond, E., 1999, Br. J. Cancer, 80, 1332-1341). Human studies of telomerase expression as related to various other
- 30 cancers are described including cervical cancer (Nakano, K., 1998, Am. J. Pathol, 153, 857-864), endometrial cancer (Kyo, S., 1999, Int. J. Cancer, 80, 60-63), meningeal carcinoma (Kleinschmidt-DeMasters, B. K., 1998, J. Neurol. Sci., 161, 124-134), lung

carcinoma (Yashima, K., 1997, Cancer Reseach, 57, 2372-2377), testicular cancer in response to cisplatin (Burger, A. M., 1997, Eur. J. Cancer, 33, 638-644), and ovarian carcinoma (Counter, C. M., 1994, Proc. Natl. Acad. Sci., 91, 2900-2904).

Particular degenerative and disease states that can be associated with telomerase expression modulation include but are not limited to:

Cancer: Almost all human tumors have detectable telomerase activity (Shay, J. W., 1997, Eur. J. Cancer, 33, 787-791). Treatment with telomerase inhibitors may provide effective cancer therapy with minimal side effects in normal somatic cells that lack telomerase activity. The therapeutic potential exists for the treatment of a wide variety of cancer types.

Restinosis: Telomerase inhibition in vascular smooth muscle cells may inhibit restinosis by limiting proliferation of these cells.

Infectious disease: Telomerase inhibition in infectious cell types that express telomerase activity may provide selective anti-infectious agent activity. Such treatment may prove especially effective in protozoan-based infection such as Giardia and Lesh Meniesis.

Transplant rejection: Telomerase inhibition in endothelial cell types may demonstrate selective immunosuppressant activity. Activation of telomerase in transplant cells could benefit grafting success through increased proliferative potential.

Autoimmune disease: Telomerase modulation in various immune cells may prove beneficial in treating diseases such as multiple sclerosis, lupus, and AIDS.

Age related disease: Activation of telomerase expression in cells at or nearing senescence as a result of advanced age or premature aging could benefit conditions such as macular degeneration, skin ulceration, and rheumatoid arthritis.

The present body of knowledge in telomerase research indicates the need for methods to assay telomerase activity and for compounds that can regulate telomerase expression for research, diagnostic, trait alteration, animal health and therapeutic use.

Gemcytabine and cyclophosphamide are non-limiting examples of chemotherapeutic agents that can be combined with or used in conjunction with the nucleic acid molecules (e.g. ribozymes and antisense molecules) of the instant invention. Those skilled in the art will recognize that other drugs such as anti-cancer compounds and therapies can be similarly be readily combined with the nucleic acid molecules of the instant invention

- (e.g. ribozymes and antisense molecules) and are hence within the scope of the instant invention. Such compounds and therapies are well known in the art (see for example *Cancer: Principles and Practice of Oncology*, Volumes 1 and 2, eds Devita, V.T., Hellman, S., and Rosenberg, S.A., J.B. Lippincott Company, Philadelphia, USA; incorporated herein by reference) and include, without limitations, antifolates; fluoropyrimidines; cytarabine; purine analogs; adenosine analogs; amsacrine; topoisomerase I inhibitors; anthracyclins; retinoids; antibiotics such as bleomycin, anthracyclins, mitomycin C, dactinomycin, and mithramycin; hexamethylmelamine; dacarbazine; l-asparaginase; platinum analogs; alkylating agents such as nitrogen mustard, melphalan, chlorambucil, busulfan, ifosfamide, 4-hydroperoxycyclophosphamide, nitrosoureas, thiotepa; plant derived compounds such as vinca alkaloids, epipodophyllotoxins, taxol; Taximexifen; radiation therapy; surgery; nutritional supplements; gene therapy; radiotherapy such as 3D-CRT; immunotoxin therapy such as ricin, monoclonal antibodies herceptin; and the like. For combination therapy, the nucleic acids of the invention are prepared in one of two ways. First, the agents are physically combined in a preparation of nucleic acid and chemotherapeutic agent, such as a mixture of a nucleic acid of the invention encapsulated in liposomes and ifosfamide in a solution for intravenous administration, wherein both agents are present in a therapeutically effective concentration (e.g., ifosfamide in solution to deliver 1000-1250 mg/m²/day and liposome-associated nucleic acid of the invention in the same solution to deliver 0.1-100 mg/kg/day). Alternatively, the agents are administered separately but simultaneously in their respective effective doses (e.g., 1000-1250 mg/m²/d ifosfamide and 0.1 to 100 mg/kg/day nucleic acid of the invention).
- Gaeta *et al.*, US patents No. 5,760,062; 5,767,278; 5,770,613 have described small molecule inhibitors of human telomerase RNA (hTR) subunit.
- Blasco *et al.*, 1995, Science, 269, 1267-1270 describe the synthesis and testing of antisense oligonucleotides targeted against a specific region of the mouse telomerase RNA (mTR) subunit and reported reduction in telomerase activity in mice.
- Bisoffi *et al.*, 1998, Eur. J. Cancer, 34, 1242-1249 have studied the down regulation of human telomerase activity by a retrovirus vector expressing antisense RNA targeted against the hTR RNA.

Norton *et al.*, 1996, Nature Biotechnology, 14, 615-619 have reported the use of a peptide nucleic acid (PNA) molecule targeting hTR RNA to down regulate telomerase activity in human immortal breast epithelial cells.

Yokoyama *et al.*, 1998, Cancer Research, 58, 5406-5410 have reported the synthesis and testing of hammerhead ribozyme constructs targeting hTR RNA resulting in a decrease in the telomerase activity in Ishikawa cells.

Henderson, European Patent Application No. 666,313-A2 describes methods of identifying and cloning hTR gene for use in gene therapy approaches for creating aberrant telomeric sequences in transfected human tumor cells. A ribozyme based gene therapy approach to inhibit the expression of hTR gene is described as well. The intended result of such therapies involves incurred genetic instability based on non-native telomeric sequences resulting in rapid cell death of the treated cells.

West *et al.*, US patent No. 5,489,508 describe methods for determining telomere length and telomerase activity in cells. Inhibitors of hTR RNA, including oligonucleotides and/or small molecules are described.

These foregoing approaches of targeting the telomerase RNA subunit (TR) may not be very beneficial, because as demonstrated by Feng *et al.*, (Feng, J., 1995, Science, 269, 1236-1241), telomerase activity in humans does not correlate well to hTR concentration.

Collins *et al.*, International PCT publication No. WO 98/01542 describes assays for the detection of telomerase activity. Four human telomerase subunit proteins are described called p140, p105, p48 and p43. In addition, hybridization probes and primers are described as inhibitors of telomerase gene function. Antibody based inhibitors of telomerase protein subunits are described.

A more attractive approach to telomerase regulation would involve the regulation of human telomerase by modulating the expression of the protein subunits of the enzyme, preferably the reverse transcriptase (hTERT) subunit. Based on reconstitution experiments, hTERT and hTR represent the minimal components of telomerase. Since hTR expression does not correlate well with telomerase activity in human cells and since many human cells express hTR without telomerase activity, targeting hTERT may prove more beneficial than targeting hTR. hTERT is the only component necessary to restore telomerase activity in normal human cells. A study in which the three major subunits of telomerase (hTR, TP1, and hTERT) were assayed in normal and malignant endometrial

tissues determined that hTERT is a rate limiting determinant of enzymatic activity of human telomerase (Kyo, S., 1999, Int. J. Cancer, 80, 60-63). Additional protein subunits that have been isolated most likely serve only a structural role in telomerase activity, but may be important in enhancing the activity of the telomerase enzyme. As such, hTERT is one of the better targets for the ectopic regulation of telomerase activity.

Cech *et al.*, International PCT publication No. WO 98/14593 describe compositions and methods related to hTERT for diagnosis, prognosis and treatment of human diseases, for altering proliferative capacity in cells and organisms, and for screening compounds and treatments with potential use as human therapeutics.

Cech *et al.*, International PCT publication No. WO 98/14592 describe nucleic acid and amino acid sequences encoding various telomerase protein subunits and motifs of *Euplotes aediculatus*, and related sequences from *Schizosaccharomyces*, *Saccharomyces* sequences, and human telomerase. The polypeptides comprising telomeric subunits and functional polypeptides and ribonucleoproteins that contain these subunits are described as well. Cech *et al.*, International PCT Publication No. WO 98/14592, mentions in general terms the possibility of using antisense and ribozymes to down regulate the expression of human telomerase reverse transcriptase enzyme.

Identification of Potential Target Sites in Human TERT RNA

The sequence of human TERT was screened for accessible sites using a computer folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in Tables 13-17.

Selection of Enzymatic Nucleic Acid Cleavage Sites in Human TERT RNA

To test whether the sites predicted by the computer-based RNA folding algorithm corresponded to accessible sites in TERT RNA, 10 hammerhead ribozyme and three G-Cleaver ribozyme sites were selected for further analysis (Table 17). Ribozyme target sites were chosen by analyzing sequences of Human TERT (Nakamura *et al.*, 1997

Science 277, 955-959; Genbank sequence accession number: NM_003219) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*,

- 1994 *J. Mol. Struct. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, **86**, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted below,
- 5 varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes for Efficient Cleavage of TERT RNA

- Ribozymes were designed to anneal to various sites in the RNA message. The
- 10 binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman *et al.*, (1987 *J. Am. Chem. Soc.*, 109, 7845), Scaringe *et al.*, (1990 *Nucleic Acids Res.*, 18, 5433) and Wincott *et al.*, *supra*, and made use of common nucleic acid protecting and coupling
- 15 groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

- Ribozymes were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51). Ribozymes were purified by gel electrophoresis using general methods or were purified by high
- 20 pressure liquid chromatography (HPLC; See Wincott *et al.*, *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes used in this study are shown below in **Table 13-17**.

Ribozyme Cleavage of TERT RNA Target *in vitro*

- Ribozymes targeted to the human TERT RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for example using the following procedure. The target sequences and the nucleotide location within the TERT RNA are given in **Tables 13-17**.

- Cleavage Reactions:* Full-length or partially full-length, internally-labeled target
- 30 RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α - 32 P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as

- substrate RNA without further purification. Alternately, substrates are 5'-³²P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming 15 μ l of a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X
- 5 ribozyme mix to an equal volume (15 μ l) of substrate RNA (maximum of 1-5 nM; 5×10^5 to 1×10^7 cpm) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess. The reaction is quenched by the addition of an equal volume (30 μ l) of 95% formamide, 20 mM EDTA, 0.05% bromophenol blue and 0.05%
- 10 xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is determined by Phosphor Imager[®] quantitation of bands representing the intact substrate and the cleavage products.

15

Example 2: PTP-1B

- Protein tyrosine phosphorylation and dephosphorylation are important mechanisms in the regulation of signal transduction pathways that control the processes of cell growth, proliferation, and differentiation (Fantl, W. J., 1993, Annu. Rev. Biochem., 62, 453-481).
- 20 Cooperative enzyme classes regulate protein tyrosine phosphorylation and dephosphorylation events. These broad classes of enzymes consist of the protein tyrosine kinases (PTKs) and protein tyrosine phosphatases (PTPs). PTKs and PTPs can exist as both receptor-type transmembrane proteins and as cytoplasmic protein enzymes. Receptor tyrosine kinases propagate signal transduction events via extracellular receptor-ligand
- 25 interactions that result in the activation of the tyrosine kinase portion of the PTK in the cytoplasmic domain. Receptor-like transmembrane PTPs function through extracellular ligand binding that modulates dephosphorylation of intracellular phosphotyrosine proteins via cytoplasmic phosphatase domains. Cytoplasmic PTKs and PTPs exert enzymatic activity without receptor-mediated ligand interactions, however, phosphorylation can
- 30 regulate the activity of these enzymes.

Protein tyrosine phosphatase 1B, a cytoplasmic PTP, was the first PTP to be isolated in homogeneous form (Tonks, N. K., 1988, J. Biol. Chem., 263, 6722-6730), characterized (Tonks, N. K., 1988, J. Biol. Chem., 263, 6731-6737), and sequenced (Charbonneau, H., 1989, Biochemistry, 86, 5252-5256). Cytoplasmic and receptor-like PTPs both share a catalytic domain characterized by eleven conserved amino acids containing cysteine and arginine residues that are critical for phosphatase activity (Streuli, M., 1990, EMBO, 9, 2399-2407). A cysteine residue at position 215 is responsible for the covalent attachment of phosphate to the enzyme (Guan, K., 1991, J. Biol. Chem., 266, 17026-17030). The crystal structure of human PTP1B defined the phosphate binding site of the enzyme as a glycine rich cleft at the surface of the molecule with cysteine 215 positioned at the base of this cleft. The location of cysteine 215 and the shape of the cleft provide specificity of PTPase activity for tyrosine residues but not for serine or threonine residues (Barford, D., 1994, Science, 263, 1397-1404).

Receptor tyrosine kinase and protein tyrosine phosphatase localization plays a key role in the regulation of phosphotyrosine mediated signal transduction. PTP-1B activity and specificity against a panel of receptor tyrosine kinases demonstrated clear differences between substrates, suggesting that cellular compartmentalization is a determinant in defining the activity and function of the enzyme (Lammers, R., 1993, J. Biol. Chem., 268, 22456-22462). Experiments have indicated that PTP-1B is localized predominantly in the endoplasmic reticulum via its 35 amino acid carboxyterminal sequence. PTP-1B is also tightly associated with microsomal membranes with its catalytic phosphatase domain oriented towards the cytoplasm (Frangioni, J. V., 1992, Cell, 68, 545-560).

PTP-1B has been identified as a negative regulator of the insulin response. PTP-1B is widely expressed in insulin sensitive tissues (Goldstein, B. J., 1993, Receptor, 3, 1-15). Isolated PTP-1B dephosphorylates the insulin receptor *in vitro* (Tonks, N. K., 1988, J. Biol. Chem., 263, 6731-6737). PTP-1B dephosphorylation of multiple phosphotyrosine residues of the insulin receptor proceeds sequentially and with specificity for the three tyrosine residues that are critical for receptor autoactivation (Ramachandran, C., 1992, Biochemistry, 31, 4232-4238). In addition to insulin receptor dephosphorylation, PTP-1B also dephosphorylates the insulin related substrate 1 (IRS-1), a principal substrate of the insulin receptor (Lammers, R., 1993, J. Biol. Chem., 268, 22456-22462).

Microinjection of PTP1B into *Xenopus* oocytes results in the inhibition of insulin stimulated tyrosine phosphorylation of endogenous proteins, including the β -subunit of the insulin and insulin-like growth factor receptor proteins. The resulting 3 to 5 fold increase over endogenous PTPase activity also blocks the activation of an S6 peptide kinase (Cicirelli, M. F., 1990, Proc. Natl. Acad. Sci., 87, 5514-5518). Inactivation of recombinant rat PTP-1B with antibody immunoprecipitation results in the dramatic increase in insulin stimulated DNA synthesis and phosphatidylinositol 3'-kinase activity. Insulin stimulated receptor autophosphorylation and insulin receptor substrate 1 tyrosine phosphorylation are increased dramatically as well through PTP-1B inhibition (Ahmad, F., 1995, J. Biol. Chem., 270, 20503-20508).

Increased PTP-1B expression correlates with insulin resistance in hyperglycemic cultured fibroblasts. In this study, desensitized insulin receptor function was observed via impaired insulin-induced autophosphorylation of the receptor. Treatment with insulin sensitivity normalizing thiazolidine derivatives resulted in the amelioration of the hyperglycemic insulin resistance via a normalization in PTP-1B expression (Maegawa, H., 1995, J. Biol. Chem., 270, 7724-7730). A murine model of insulin resistance with a knockout of the heterotrimeric GTP-binding protein subunit *Gia2* provides a type 2 diabetes phenotype that correlates with the increased expression of PTP-1B (Moxam, C. M., 1996, Nature, 379, 840-844).

PTP-1B interacts directly with the activated insulin receptor β -subunit. An inactive homolog of PTP-1B was used to precipitate the activated insulin receptor in both purified receptor preparations and whole-cell lysates. Phosphorylation of the insulin receptor's triple tyrosine residues in the kinase domain is necessary for PTP-1B interaction. Furthermore, insulin stimulates tyrosine phosphorylation of PTP-1B (Seely, B. L., 1996, Diabetes, 45, 1379-1385). A similar study confirmed the direct interaction of PTP-1B with the insulin receptor β -subunit as well as the required multiple phosphorylation sites within the receptor and PTP-1B (Bandyopadhyay, D., J. Biol. Chem., 272, 1639-1645).

Knockout mice lacking the PTP-1B gene (both homozygous PTP-1B^{-/-} and heterozygous PTP-1B^{+/-}) have been used to study the specific role of PTP-1B relating to insulin action *in vivo*. The resulting PTP-1B deficient mice were healthy and, in the fed state, had lower blood glucose and circulating insulin levels that were half that of their

PTP-1B^{+/-} expressing littermates. These PTP-1B deficient mice demonstrated enhanced insulin sensitivity in glucose and insulin tolerance tests. At the physiological level, the PTP-1B deficient mice showed increased phosphorylation of the insulin receptor after insulin administration. When fed a high fat diet, the PTP-1B deficient mice were resistant to weight gain and remained insulin sensitive as opposed to normal PTP-1B expressing mice, who rapidly gained weight and become insulin resistant (Elchebly, M., 1999, Science, 283, 1544-1548). As such, modulation of PTP-1B expression could be used to regulate autophosphorylation of the insulin receptor and increase insulin sensitivity *in vivo*. This modulation could prove beneficial in the treatment of insulin related disease states.

In light of the above findings, particular disease states that involve PTP-1B expression include but are not limited to:

Diabetes: Both type 1 and type 2 diabetes may be treated by modulation of PTP-1B expression. Type 2 diabetes correlates to desensitized insulin receptor function (White *et al.*, 1994). Disruption of the PTP-1B dephosphorylation of the insulin receptor *in vivo* manifests in insulin sensitivity and increased insulin receptor autophosphorylation (Elchebly *et al.*, 1999). Insulin dependant diabetes, type 1, may respond to PTP-1B modulation through increased insulin sensitivity.

Obesity: Elchebly *et al.*, 1999, demonstrated that PTP-1B deficient mice were resistant to weight gain when fed a high fat diet compared to normal PTP-1B expressing mice. This finding suggests that PTP-1B modulation may be beneficial in the treatment of obesity. Ahmad *et al.*, 1997, Metab. Clin. Exp., 46, 1140-1145, describe reduced PTPs in adipose tissue and improved insulin sensitivity in obese subjects following weight loss.

Troglitazone is a non-limiting example of a pharmaceutical agent that can be combined with or used in conjunction with the nucleic acid molecules (e.g. ribozymes and antisense molecules) of the instant invention. Those skilled in the art will recognize that other drugs such as anti-diabetes and anti-obesity compounds and therapies can be similarly be readily combined with the nucleic acid molecules of the instant invention (e.g. ribozymes and antisense molecules) are hence within the scope of the instant invention.

Methods have been developed to assay PTP-1B activity.

Maegawa *et al.*, 1995, J. Biol. Chem., 270, 7724-7730, describe a tissue culture model in which Rat 1 fibroblasts expressing human insulin receptors can be used to model

hyperglycemia induced insulin resistance. Maegawa *et al.* also describe assays to measure PTPase activity using labeled phosphorylated insulin receptors and by immunoenzymatic techniques.

- 5 Moxham *et al.*, 1996, *Nature*, 379, 840-844, describe a murine animal and tissue culture model employing $\text{G}\alpha 2$ deficiency to study hyperinsulinaemia, impaired glucose tolerance and resistance to insulin *in vivo*. Assays for PTPase activity and tyrosine phosphorylation of insulin-receptor substrate 1 are described.

- 10 Khandelwal *et al.*, 1995, *Molecular and Cellular Biochemistry*, 153, 87-94, describe four different animal models for studying insulin dependent and insulin resistant diabetes mellitus. These models were used to study the effect of vanadate, an insulin mimetic and PTPase inhibitor, on the insulin-stimulated phosphorylation of the insulin receptor and its tyrosine kinase activity.

Wang *et al.*, 1999, *Biochim. Biophys. Acta*, 1431, 14-23, describe fluorescein monophosphates as fluorogenic substrates for PTPs.

- 15 Various methods and compounds have been developed to inhibit protein tyrosine phosphatase activity.

Wrobel *et al.*, 1999, *J. Med. Chem.*, 42, 3199-3202, describe PTP-1B inhibition and antihyperglycemic activity in the ob/ob mouse model by 11-arylbenzo[b]naphtho[2,3-d]furans and arylbenzo[b]naphtho[2,3-d]thiophenes.

- 20 Andersen *et al.*, International PCT publication No. WO 98/DK407 describe the preparation of thienopyridzinones and thienochromenones as modulators of PTPases.

Taing *et al.*, 1999, *Biochemistry*, 38, 3793-3803, describe potent and highly selective inhibitors of PTP-1B comprising an array of bis(aryldifluorophosphonates).

- 25 Ham *et al.*, 1999, *Bioorg. Med. Chem. Lett.*, 9, 185-186, describe selective inactivation of PTP-1B by a sulfone analog of naphthoquinone.

Desmarais *et al.*, 1999, *Biochem. J.*, 337, 219-223, describe [Difluoro(phosphono)methyl]phenylalanine-containing peptide inhibitors of PTPs.

Taylor *et al.*, 1998, *Bioorg. Med. Chem.*, 6, 2235, describe potent non-peptidyl inhibitors of PTP-1B.

- 30 Kotoris *et al.*, 1998, *Bioorg. Med. Chem. Lett.*, 8, 3275-3280, describe novel phosphate mimetics for the design of non-peptidyl inhibitors of PTPs.

- Groves *et al.*, 1998, *Biochemistry*, 37, 17773-17783, describe the structural basis for PTP-1B inhibition by the phosphotyrosine peptide mimetics (difluoronaphthylmethyl)phosphonic acid and the fluoromalonyl tyrosines with complexed crystal structures.
- 5 Yao *et al.*, 1998, *Bioorgl Med. Chem.*, 6, 1799-1810, describe the structure-based design and synthesis of small molecule PTP-1B inhibitors comprising novel naphthyldifluoromethyl phosphonic acids 1 and 2.
- Taylor *et al.*, 1998, *Bioorg. Med. Chem.*, 6, 1457-1468, describe potent non-peptidyl inhibitors of PTP-1B.
- 10 Desmarais *et al.*, 1998, *Arch. Biochem. Biophys.*, 354, 225-231, describe inhibition of PTP-1B and CD45 by sulfotyrosyl peptides.
- Mjalli *et al.*, application US 96-766114, cont. in part of US patent No. 543,630, describe the preparation of heterocyclic compounds as modulators of proteins with phosphotyrosine recognition units.
- 15 Wang *et al.*, 1998, *Bioorg. Med. Chem. Lett.*, 8, 345-350, describe naphthalenebis[α,α -difluoromethylenephosphonates] as potent inhibitors of PTPs.
- Rice *et al.*, 1997, *Biochemistry*, 36, 15965-15974, describe a targeted library of small molecule tyrosine and dual-specificity phosphatase inhibitors with random side chain variation from a rational core design.
- 20 Olefsky, International PCT publication No. WO 97/US2752 describes a method and phosphopeptides used for the treatment of insulin resistance based on the association of PTP-1B with the activated insulin receptor. Also included is a method for determining whether a compound inhibits PTP-1B binding to the insulin receptor.
- Huyer *et al.*, 1997, *J. Biol. Chem.*, 272, 843-851, describe the mechanism of
- 25 inhibition of PTPases by vanadate and pervanadate.
- Burke *et al.*, 1996, *Biochemistry*, 35, 15989-15996, describe the structure-based design of PTP-1B inhibitors.
- Tonks *et al.*, International PCT publication No. WO 97/US13016, describe substrate-trapping protein PTPase mutants for identification of tyrosine-phosphorylated
- 30 protein substrates and their clinical uses.

The human genome is thought to contain up to 100 PTPases, each varying slightly in chemistry but vastly in function. Compounds designed to inhibit PTP-1B activity specifically by covalent binding to or modification of PTP-1B have the potential for multiple side effects. Conventional drug substances that will potently suppress PTP-1B activity with few or no side effects from interaction with other PTPs are difficult to envision. A more attractive approach to PTP-1B modulation would involve the specific regulation of PTP-1B expression with oligonucleotides.

Identification of Potential Target Sites in Human PTP-1B RNA

The sequence of human PTP-1B was screened for accessible sites using a computer folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in **Tables 3-8**.

Selection of Enzymatic Nucleic Acid Cleavage Sites in Human PTP-1B RNA

To test whether the sites predicted by the computer-based RNA folding algorithm corresponded to accessible sites in PTP-1B RNA, 10 hammerhead ribozyme, five NCH and three G-Cleaver ribozyme sites were selected for further analysis (**Table 8**). Ribozyme target sites were chosen by analyzing sequences of Human PTP-1B (Genbank accession number M33689) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*, 1994 *J. Mol. Struc. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, **86**, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted below, varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes for Efficient Cleavage of PTP-1B RNA

Ribozymes were designed to anneal to various sites in the RNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman et al., (1987 J. Am. Chem. Soc., 109, 7845), Scaringe et al., (1990 Nucleic Acids Res., 18, 5433) and Wincott et al., supra, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

Ribozymes were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, Methods Enzymol. 180, 51). Ribozymes were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; see Wincott et al., supra; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes used in this study are shown below in **Tables 3-8**.

Ribozyme Cleavage of PTP-1B RNA Target *in vitro*

Ribozymes targeted to the human PTP-1B RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for example, using the following procedure. The target sequences and the nucleotide location within the PTP-1B RNA are given in **Tables 3-8**.

Cleavage Reactions: Full-length or partially full-length, internally-labeled target RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α -³²P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates are 5'-³²P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess.

The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is determined by Phosphor Imager[®] quantitation of bands representing the intact substrate and the cleavage products.

Example 3: MetAP-2

Methionyl aminopeptidases are metalloproteases that are known to possess post-translational enzymatic activity by hydrolytically cleaving amino-terminal methionine residues from nascent peptide substrates in a non-processive manner (Kendall, R. L., 1992, J. Biol. Chem., 267, 20667-20673). This family of enzymes is divided into two classes (type 1 and type 2) based on differences in sequence, although the overall structure of the two classes are similar (Liu, S., 1998, Science, 282, 1324-1327). Methionine aminopeptidase expression appears to be involved in the control of cellular proliferation. Deletion of the MetAP gene from *E. Coli* is lethal (Chang, S. Y., 1989, J. Bacteriol., 171, 4071-4072). In *Saccharomyces cerevisiae*, deletion of the gene that codes for either MetAP-1 or 2 results in a slow growth phenotype while deletion of both genes is lethal (Li, X., 1995, Proc. Natl. Acad. Sci., 92, 12357-12361). (Human methionine aminopeptidase-1, MetAP-1, accession No. P53582).

The aminopeptidase function of this class of enzymes may serve a regulatory role in activating signal peptides in conjunction with N-myristoyl transferase (NMT) activity. NMT is expressed from a lethal gene in yeast (Duronio, R. J., 1989, Science, 243, 796-800). NMT is responsible for amino-terminal ligation of myristic acid onto nascent peptides and cannot act on peptides with an amino-terminal methionine residue (Resh, M. D., 1996, Cell. Signal., 8, 403-412). Myristoylation of proteins correlates to intracellular localization events that may determine why certain signaling proteins are dependent on NMT for activity (Taunton, J., 1997, Chemistry & Biology, 4, 493-496). Protein tyrosine kinase Src is dependant on myristoylation for activity and has been identified as an upstream regulator of human vascular endothelial growth factor (VEGF) expression

through hypoxic induction in solid tumors (Mukhopadhyay, D., 1995, Nature, 375, 577-581). MetAPs may therefore regulate the activation of signal peptides (such as VEGF) through cotranslational modification of nascent peptides with NMT. Disruption of protein myristoylation by MetAP inhibition could result in the improper localization of signaling proteins resulting in inhibition of cell growth. (Human N-myristoyltransferase, hNMT, accession No. AF043324.)

Fumagillin, a sesquiterpene diepoxide metabolite of the fungus *Aspergillus fumigatus*, and a related compound TNP-470, are strong inhibitors of growth in cultured endothelial cells. The antiproliferative and angiostatic activity of fumagillin was originally discovered by the serendipitous contamination of *Aspergillus fumigatus* in an endothelial cell culture dish in which cells closest to the fungal colony displayed growth inhibition. Synthetic analogs of fumagillin were later synthesized resulting in the discovery of TNP-470, which is 50 times more potent of an inhibitor than fumagillin and is less toxic in mice (Ingber, D., 1990, Nature, 348, 555-557). Treatment of endothelial cells with these compounds results in late G1 phase arrest. TNP-470 inhibits the signaling pathway of retinoblastoma gene product phosphorylation, cyclin dependent kinases cdk2 and cdk4 activation, and cyclins E and A expression (Abe, J., 1994, Cancer Res., 54, 3407-3412). TNP-470 has also been shown to potentially inhibit endothelial cell proliferation induced by the growth factors VEGF and bFGF (Toi, M., 1994, Oncology Reports, 1, 423-426).

The bifunctional protein MetAP-2 has been identified as the molecular target for fumagillin and related compounds that demonstrate antiproliferative activity in endothelial cells. The use of affinity chromatography with a fumagillin-biotin conjugate resulted in the isolation of a 67-kDa mammalian protein through covalent interaction with the bound substrate. Analysis of digested peptide fragments from the isolated protein revealed MetAP-2 as the covalently bound substrate. Subsequent growth inhibition studies in yeast utilizing MetAP-1 and MetAP-2 deletion strains determined that MetAP-2 is selectively inhibited by fumagillin *in vivo* (Sin, N., 1997, Proc. Natl. Acad. Sci., 94, 6099-6103). A similar study with TNP-470 and ovalicin, another potent inhibitor of neovascularization, determined that MetAP-2 is the molecular target for these fumagillin-related compounds (Griffith, E. C., 1997, Chemistry & Biology, 4, 461-471).

MetAP-2 expression correlates with cellular growth. Non-dividing cells in culture have no detectable levels of the 67-kDa MetAP-2 protein by immunoassay. MetAP-2 has been shown to affect translational initiation by association with eukaryotic initiation factor 2 α (eIF-2 α) (Ray, M. K., 1992, Proc. Natl. Acad. Sci., 89, 539-543). The binding of

5 MetAP-2 with eIF-2 α inhibits the heme-regulated inhibitor kinase (HRI) phosphorylation of eIF-2 α *in vitro* in reticulocyte lysates (Datta, B., 1988, Proc. Natl. Acad. Sci., 85, 3324-3328). MetAP-2/eIF-2 α binding results in the partial reversal of protein synthesis inhibition by double stranded RNA dependent kinase mediated phosphorylation *in vivo* (Wu, S., 1996, Biochemistry, 35, 8275-8280). Griffith *et al.* also determined that covalent

10 binding of TNP-470 and ovalicin, while potentially inhibiting methionine aminopeptidase type 2 activity specifically, did not affect the regulatory activity of MetAP-2 on eIF-2 α . This finding by Griffith *et al.* rules out the possibility that control of eIF-2 α phosphorylation by MetAP-2 is responsible for the inhibition of endothelial cell proliferation by fumagillin related compounds.

15 Particular angiogenesis related degenerative and disease states that can be associated with MetAP expression modulation include but are not limited to:

Cancer: Solid tumors are unable to grow or metastasize without the formation of new blood vessels (Hanahan, D., 1996, Cell, 86, 353-364). Inhibition of angiogenesis via MetAP modulation can potentially be used to treat a wide variety of cancers.

20 Diabetic retinopathy and age related macular degeneration: Ocular neovascularization is observed in diabetic retinopathy, which is mediated by up-regulation of VEGF (Adamis, A. P., 1994, Amer. J. Ophthalmol., 118, 445-450). The requirement of protein kinase Src in hypoxia induced VEGF expression (Mukhopadhyay, D., 1995, Nature, 375, 577-581) indicates that MetAP modulation of aminopeptidase activity can potentially be used to treat conditions involving ocular neovascularization.

Arthritis: The ingrowth of a vascular pannus in arthritis may be mediated by the overexpression of angiogenic factors from infiltrating inflammatory cells, macrophages, and immune cells (Peacock, D. J., 1992, J. exp. Med., 175, 1135-1138). Angiogenesis

30 inhibition through MetAP modulation can potentially be used to treat arthritis.

Psoriasis: Angiogenesis has been implicated in psoriasis due to overexpression of the angiogenic polypeptide interleukin-8 and decreased expression of the angiogenesis inhibitor thrombospondin (Nickoloff, B. J., 1994, Amer. J. Pathol. 44, 820-828).

Angiogenesis inhibition through MetAP modulation can potentially be used to treat psoriasis.

Female reproduction: Angiogenesis in the female reproductive system has been implicated in several disorders of the reproductive tract (Reynolds, L. P., 1992, FASEB, 6, 886-892). Modulation of angiogenesis through control of MetAP may have various applications in the area of female reproduction and fertility.

Various methods have been developed to assay MetAP activity.

Griffith *et al.*, 1998, Proc. Natl. Acad. Sci., 95, 15183-15188, describe an enzymatic assay for MetAP-2 activity *in vitro* and an endothelial cell culture proliferation assay for MetAP-2 activity *in vivo*.

Weber *et al.*, 1999, International PCT publication No. WO 98/US-21231 describe novel fluorescent reporter molecules and an enzymatic assay that can be used for determining the activity of MetAP-2 for drug screening and determining the chemosensitivity of human cancer cells to treatment with chemotherapeutic drugs.

Larrabee, J. A. *et al.*, 1999, Anal. Biochem, 269, 194-198, describe the use of a high-pressure liquid chromatographic (HPLC) method for assaying MetAP-2 activity with application to the study of enzymic inactivation.

Quantitative methods have been developed to assay the efficacy of antiangiogenic therapies.

Watanabe *et al.*, 1992, Molec. Biol. Cell, 3, 324a, describe the quantitation of angiogenic peptides (bFGF) in human serum as a prognostic test for breast cancer.

Nguyen *et al.*, 1994, J. Natn. Cancer Inst., 86, 356-361, describe the quantitation of angiogenic peptides (bFGF) in the urine of patients with a wide spectrum of cancers.

Li *et al.*, 1994, The Lancet, 344, 82-86, describe the quantitation of angiogenic peptides (bFGF) in the cerebrospinal fluid of children with brain tumors. This work also describes determining the extent of neovascularization in histological sections by utilizing microvessel count.

The present body of knowledge in angiogenesis research indicates the need for compounds that can modulate MetAP activity for research, diagnostic, trait alteration, animal health and therapeutic use.

Griffith *et al.*, International PCT publication No. WO 9856372 describe small molecule inhibitors of MetAP2 and uses thereof.

D'Amato *et al.*, International PCT publication No. WO 9805293 describe the use of AGM-1470 (TNP-470) as an angiogenesis inhibitor for use in regulating the female reproductive system and for treating diseases of the reproductive tissue.

Davidson *et al.*, US patent No. 5,801,146 describe a compound and method for inhibiting angiogenesis using mammalian kringles 5 protein.

Cao *et al.*, US patent No. 5,854,221 describe a protein-based endothelial cell proliferation inhibitor and its method of use.

Chang *et al.*, US patent No. 5,888,796 describe a clone of a nucleotide sequence encoding a protein having two functions comprising methionine aminopeptidase activity and anti eIF-2 phosphorylation activity.

Wang *et al.*, 1998, Proc. Am. Assoc. Cancer Res., 39, 98 (abstr.) describe blocked proliferation of human endothelial cells by human MetAP-2 antisense oligonucleotides.

A rat corneal model has been developed to study ribozyme inhibition of VEGF receptor-mediated angiogenesis (Pavco, P. A., 1999, Nucleic Acids Research, 27, 2569-2577). A similar study employing MetAP-2 inhibition could be used to study ribozyme based inhibition of MetAP-2 induced angiogenesis *in vivo*.

Identification of Potential Target Sites in Human MetAP-2 RNA

The sequence of human MetAP-2 was screened for accessible sites using a computer-folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in Tables 9-12.

Selection of Enzymatic Nucleic Acid Cleavage Sites in Human MetAP-2 RNA

To test whether the sites predicted by the computer-based RNA folding algorithm corresponded to accessible sites in MetAP-2 RNA, 11 hammerhead ribozyme, 4 NCH and three G-Cleaver ribozyme sites were selected for further analysis (Table 12). Ribozyme

- target sites were chosen by analyzing sequences of Human MetAP-2 (Genbank accession number HSU29607) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*, 1994 *J. Mol. Struct. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted below, varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes for Efficient Cleavage of MetAP-2 RNA

- Ribozymes were designed to anneal to various sites in the RNA message. The binding arms are complementary to the target site sequences described above. The ribozymes were chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman *et al.*, (1987 *J. Am. Chem. Soc.*, 109, 7845), Scaringe *et al.*, (1990 *Nucleic Acids Res.*, 18, 5433) and Wincott *et al.*, *supra*, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

- Ribozymes were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51). Ribozymes were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; see Wincott *et al.*, *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes used in this study are shown below in **Table 9-12**.

Ribozyme Cleavage of MetAP-2 RNA Target *in vitro*

- Ribozymes targeted to the human MetAP-2 RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for

example, using the following procedure. The target sequences and the nucleotide location within the MetAP-2 RNA are given in **Tables 9-12**.

- Cleavage Reactions:* Full-length or partially full-length, internally-labeled target RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [a-³²P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates are 5'-³²P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess. The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is determined by Phosphor Imager[®] quantitation of bands representing the intact substrate and the cleavage products.

20

Example 4: BACE, ps-1, ps-2

- Alzheimer's disease (AD) is a progressive, degenerative disease of the brain which affects approximately 4 million people in the United States alone. An estimated 14 million Americans will have Alzheimer's disease by the middle of the next century if no cure or definitive prevention of the disease is found. Nearly one out of ten people over age 65 and nearly half of those over 85 have Alzheimer's disease. Alzheimer's disease is not confined to the elderly, a small percentage of people in their 30's and 40's are afflicted with early onset AD. Alzheimer's disease is the most common form of dementia, and amounts to the third most expensive disease in the US following heart disease and cancer. An estimated 100 billion dollars are spent annually on Alzheimer's disease (National Alzheimer's Association, 1999).

Alzheimer's disease is characterized by the progressive formation of insoluble plaques and vascular deposits in the brain consisting of the 4 kD amyloid β peptide ($A\beta$). These plaques are characterized by dystrophic neurites that show profound synaptic loss, neurofibrillary tangle formation, and gliosis. $A\beta$ arises from the proteolytic cleavage of the large type I transmembrane protein, β -amyloid precursor protein (APP) (Kang *et al.*, 1987, *Nature*, 325, 733). Processing of APP to generate $A\beta$ requires two sites of cleavage by a β -secretase and a γ -secretase. β -secretase cleavage of APP results in the cytoplasmic release of a 100 kD soluble amino-terminal fragment, APPs β , leaving behind a 12 kD transmembrane carboxy-terminal fragment, C99. Alternately, APP can be cleaved by a α -secretase to generate cytoplasmic APPs α and transmembrane C83 fragments. Both remaining transmembrane fragments, C99 and C83, can be further cleaved by a γ -secretase, leading to the release and secretion of Alzheimer's related $A\beta$ and a non-pathogenic peptide, p3, respectively (Vassar *et al.*, 1999, *Science*, 286, 735-741). Early onset familial Alzheimer's disease is characterized by mutant APP protein with a Met to Leu substitution at position P1, characterized as the "Swedish" familial mutation (Mullan *et al.*, 1992, *Nature Genet.*, 1, 345). This APP mutation is characterized by a dramatic enhancement in β -secretase cleavage (Citron *et al.*, 1992, *Nature*, 360, 672).

The identification of β -secretase, and γ -secretase constituents involved in the release of β -amyloid protein is of primary importance in the development of treatment strategies for Alzheimer's disease. Characterization of α -secretase is also important in this regard since α -secretase cleavage may compete with β -secretase cleavage resulting in non-pathogenic vs. pathogenic protein production. Involvement of the two metalloproteases, ADAM 10, and TACE has been demonstrated in α -cleavage of AAP (Buxbaum *et al.*, 1999, *J. Biol. Chem.*, 273, 27765, and Lammich *et al.*, 1999, *Proc. Natl. Acad. Sci. U.S.A.*, 96, 3922). Studies of γ -secretase activity have demonstrated presenilin dependence (De Strooper *et al.*, 1998, *Nature*, 391, 387, and De Strooper *et al.*, 1999, *Nature*, 398, 518), and as such, presenilins have been proposed as γ -secretase even though presenilin does not present proteolytic activity (Wolfe *et al.*, 1999, *Nature*, 398, 513).

Recently, Vassar *et al.*, 1999, *supra* reported β -secretase cleavage of AAP by the transmembrane aspartic protease beta site APP cleaving enzyme, BACE. While other potential candidates for β -secretase have been proposed (for review see Evin *et al.*, 1999, *Proc. Natl. Acad. Sci. U.S.A.*, 96, 3922), none have demonstrated the full range of characteristics expected from this enzyme. Vassar *et al.*, *supra*, demonstrate that BACE expression and localization are as expected for β -secretase, that BACE overexpression in cells results in increased β -secretase cleavage of APP and Swedish APP, that isolated BACE demonstrates site specific proteolytic activity on APP derived peptide substrates, and that antisense mediated endogenous BACE inhibition results in dramatically reduced β -secretase activity.

Current treatment strategies for Alzheimer's disease rely on either the prevention or the alleviation of symptoms and/or the slowing down of disease progression. Two drugs approved in the treatment of Alzheimer's, donepezil (Aricept®) and tacrine (Cognex®), both cholinomimetics, attempt to slow the loss of cognitive ability by increasing the amount of acetylcholine available to the brain. Antioxidant therapy through the use of antioxidant compounds such as alpha-tocopherol (vitamin E), melatonin, and selegeline (Eldepryl®) attempt to slow disease progression by minimizing free radical damage. Estrogen replacement therapy is thought to incur a possible preventative benefit in the development of Alzheimer's disease based on limited data. The use of anti-inflammatory drugs may be associated with a reduced risk of Alzheimer's as well. Calcium channel blockers such as Nimodipine® are considered to have a potential benefit in treating Alzheimer's disease due to protection of nerve cells from calcium overload, thereby prolonging nerve cell survival. Nootropic compounds, such as acetyl-L-carnitine (Alcar®) and insulin, have been proposed to have some benefit in treating Alzheimer's due to enhancement of cognitive and memory function based on cellular metabolism.

Whereby the above treatment strategies may all improve quality of life in Alzheimer's patients, there exists an unmet need in the comprehensive treatment and prevention of this disease. As such, there exists the need for therapeutics effective in reversing the physiological changes associated with Alzheimer's disease, specifically, therapeutics that can eliminate and/or reverse the deposition of amyloid β peptide. The use of compounds to modulate the expression of proteases that are instrumental in the

release of amyloid β peptide, namely β -secretase (BACE), and γ -secretase (presenilin), is of therapeutic significance.

- Tsai *et al.*, 1999, Book of Abstracts, 218th ACS National Meeting, New Orleans, Aug 22-26, describe substrate-based alpha-aminoisobutyric acid derivatives of difluoro ketone peptidomimetic inhibitors of amyloid β peptide through γ -secretase inhibition.

Czech *et al.*, International PCT publication No. WO/9921886, describe peptides capable of inhibiting the interaction between presenilins and the β -amyloid peptide or its precursor for therapeutic use.

- Fournier *et al.*, International PCT publication No. WO/9916874, describe human brain proteins capable of interacting with presenilins and cDNAs encoding them toward therapeutic use.

St. George-Hyslop *et al.*, International PCT publication No. WO/9727296, describe genes for proteins that interact with presenilins and their role in Alzheimer's disease toward therapeutic use.

- Vassar *et al.*, 1999, *Science*, 286, 735-741, describe specific antisense oligonucleotides targeting BACE, used for inhibition studies of endogenous BACE expression in 101 cells and APP_{sw} cells via lipid mediated transfection.

- Vassar *et al.*, 1999, *Science*, 286, 735-741, describe a cell culture model for studying BACE inhibition. Specific antisense nucleic acid molecules targeting BACE mRNA were used for inhibition studies of endogenous BACE expression in 101 cells and APP_{sw} (Swedish type amyloid precursor protein expressing) cells via lipid mediated transfection. Antisense treatment resulted in dramatic reduction of both BACE mRNA by Northern blot analysis, and APP_{sw} ("Swedish" type β -secretase cleavage product) by ELISA, with maximum inhibition of both parameters at 75-80%. This model was also used to study the effect of BACE inhibition on amyloid β -peptide production in APP_{sw} cells.

- Games *et al.*, 1995, *Nature*, 373, 523-527, describe a transgenic mouse model in which mutant human familial type APP (Phe 717 instead of Val) is overexpressed. This model results in mice that progressively develop many of the pathological hallmarks of Alzheimer's disease, and as such, provides a model for testing therapeutic drugs.

- Particular degenerative and disease states that can be associated with BACE expression modulation include but are not limited to Alzheimer's disease and dementia.

Donepezil, tacrine, selegeline, and acetyl-L-carnitine are non-limiting examples of pharmaceutical agents that can be combined with or used in conjunction with the nucleic acid molecules (e.g. ribozymes and antisense molecules) of the instant invention. Those skilled in the art will recognize that other drugs such as diuretic and antihypertensive compounds and therapies can be similarly be readily combined with the nucleic acid molecules of the instant invention (e.g. ribozymes and antisense molecules) are hence within the scope of the instant invention.

Identification of Potential Target Sites in Human BACE RNA

The sequence of human BACE was screened for accessible sites using a computer-folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in **Tables 18-23**.

Selection of Enzymatic Nucleic Acid Cleavage Sites in Human BACE RNA

Ribozyme target sites were chosen by analyzing sequences of Human BACE (Genbank sequence accession number: AF190725) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*, 1994 *J. Mol. Struct. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted below, varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes and Antisense for Efficient Cleavage and/or blocking of BACE RNA

Ribozymes and antisense constructs were designed to anneal to various sites in the RNA message. The binding arms of the ribozymes are complementary to the target site sequences described above, while the antisense constructs are fully complimentary to the target site sequences described above. The ribozymes and antisense constructs were

chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman et al., (1987 *J. Am. Chem. Soc.*, 109, 7845), Scaringe et al., (1990 *Nucleic Acids Res.*, 18, 5433) and Wincott et al., *supra*, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

Ribozymes and antisense constructs were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51). Ribozymes and antisense constructs were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; See Wincott et al., *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes and antisense constructs used in this study are shown below in **Table 18-23**.

Ribozyme Cleavage of BACE RNA Target *in vitro*

Ribozymes targeted to the human BACE RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for example, using the following procedure. The target sequences and the nucleotide location within the BACE RNA are given in **Tables 18-23**.

Cleavage Reactions: Full-length or partially full-length, internally-labeled target RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α - 32 P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates are 5'- 32 P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess. The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM

EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is

5 determined by Phosphor Imager® quantitation of bands representing the intact substrate and the cleavage products.

Example 5: Phospholamban

Cardiac disease leading to heart failure is the leading cause of combined morbidity and mortality in the developed world. Nearly twenty million people worldwide suffer from heart failure related disease. An estimated five million Americans are afflicted with congestive heart failure (CHF), with 400,000 new cases diagnosed each year. In the US, cardiac disease associated failure results in approximately 40,000 deaths per year, and is associated with an additional 250,000 deaths (Harnish, 1999, *Drug & Market*

10 *Development*, 10, 114-119). Heart failure related disease represents a major public health issue due to an overall increase in prevalence and incidence in aging populations with a greater proportion of survivors of acute myocardial infarction (AMI) (Kannel *et al.*, 1994, *Br. Heart. J.*, 72 (suppl), 3). Heart failure related disease represents the most common reason for hospitalization of elderly patients in the US. The resulting life expectancy of

15 these patients is less than that of many common cancers, with five year survival rates for men and women at only 25% and 38% respectively, and with one year mortality rates for severe heart failure at 50% (Ho *et al.*, 1993, *Circulation*, 88, 107).

Heart disease is characterized by a progressive decrease in cardiac output resulting from insufficient pumping activity of the diseased heart. The resulting venous back-pressure results in peripheral and pulmonary dysfunctional congestion. The heart responds to a variety of mechanical, hemodynamic, hormonal, and pathological stimuli by increasing muscle mass in response to an increased demand for cardiac output. The resulting transformation of heart tissue (myocardial hypertrophy) can arise as a result of genetic, physiologic, and environmental factors, and represents an early indication of

20 clinical heart disease and an important risk factor for subsequent heart failure (Hunter and Chien, 1999, *New England J. of Medicine*, 99, 313-322).

Coronary heart disease is a predominant factor in the development of the cardiac disease state, along with prior AMI, hypertension, diabetes mellitus, and valvular heart disease. Diagnosis of cardiac disease includes determination of coronary heart disease associated left ventricular systolic dysfunction (LVSD) and/or left ventricular diastolic dysfunction (LVDD) by echocardiographic imaging (Cleland, 1997, *Dis Management Health Outcomes*, 1, 169). Promising diagnosis may also rely on assaying atrial natriuretic peptide (ANP) and brain natriuretic peptide (BNP) concentrations. ANP and BNP levels are indicative of the level of ventricular dysfunction (Davidson *et al.*, 1996, *Am. J. Cardiol.*, 77, 828).

Current treatment strategies for cardiac disease associated failure are varied. Diuretics are often used to reduce pulmonary edema and dyspnea in patients with fluid overload, and are usually used in conjunction with angiotensin converting enzyme (ACE) inhibitors for vasodilation. Digoxin is another popular choice for treating cardiac disease as an inotropic agent, however, doubts remain concerning the long-term efficacy and safety of Digoxin (Harnish, 1999, *Drug & Market Development*, 10, 114-119). Carvedilol, a beta-blocker, has been introduced to complement the above treatments in order to slow down the progression of cardiac disease. Antiarrhythmic agents can be used in order to reduce the risk of sudden death in patients suffering from cardiac disease. Lastly, heart transplants have been effective in the treatment of patients with advanced stages of cardiac disease, however, the limited supply of donor hearts greatly limits the scope of this treatment to the broad population (Harnish, 1999, *Drug & Market Development*, 10, 114-119).

Whereby the above treatment strategies can all improve morbidity and mortality associated with cardiac disease, the only existing definitive approach to curing the diseased heart is replacement by transplant. Even a healthy, transplanted heart can become diseased in response to the various stresses of mechanical, hemodynamic, hormonal, and pathological stimuli associated with extrinsic risk factors. As such there exists the need for therapeutics effective in reversing the physiological changes associated with cardiac disease.

Myocardial hypertrophy and apoptosis are the underlying degenerative process associated with cardiac hypertrophy and failure. A variety of signaling pathways are involved in the progression of myocardial hypertrophy and myocardial apoptosis. Genetic

studies have been instrumental in elucidating these pathways and their involvement in cardiac disease through *in vitro* assays of cardiac muscle cells and *in vivo* studies of genetically engineered animals.

- Studies in which the expression of specific genes have been altered in cardiac
- 5 myocytes have shown that specific peptide hormones, growth factors, and cytokines can activate various features of the hypertrophic response (Hunter and Chien, 1999, *New England J of Medicine*, 99, 313-322). Particular substances that have been characterized from these studies include potential therapeutic and molecular targets involved in heart failure. Hunter *et al.*, in Chien, KR, ed. *Molecular basis of heart disease: a companion to Braunwald's Heart Disease*, Philadelphia: W.B. Saunders, 1999:211-250, describe
 - 10 classes of therapeutic and molecular targets involved in heart failure including:
 1. Endothelin 1 and angiotensin II receptor antagonists, and antagonists of ras, p38, and c-jun N-terminal kinase (JNK) for inhibition of pathologic hypertrophy.
 2. Insulin like growth factor I and growth hormone receptor stimulation for promotion of
 - 15 physiologic hypertrophy.
 3. beta-1-adrenergic receptor blockers for inhibition of neurohumoral over stimulation.
 4. Phospholamban and Sarcolipin small molecule inhibitors for relief of sarcoplasmic reticulum calcium ATPase inhibition to provide enhancement of myocardial contractile and relaxation responses.
 - 20 5. Small molecule inhibitors of β -adrenergic receptor kinase to counteract the desensitization of G protein coupled receptor kinases in order to provide enhancement of myocardial contractile and relaxation responses.
 6. Enhancement of angiogenic growth factors (VEGF, FGF-5) for relief of energy deprivation in cardiac tissues.
 - 25 7. Promoters of myocyte survival including gp 130 ligands (cardiotrophin 1), and Neuregulin for the inhibition of apoptosis of myocytes.
 8. Inhibitors of apoptosis such as Caspase inhibitors for the inhibition of apoptosis of myocytes.
 9. Inhibitors of cytokines such as TNF-alpha for the inhibition of apoptosis of myocytes.
 - 30 Congestive heart failure, heart failure, dilated cardiomyopathy and pressure overload hypertrophy are nonlimiting examples of disorders and disease states that can be associated with the above classes of molecular targets.

The failure of cardiac contractile performance leading to cardiac disorders and disease, governed by impairment of cardiac excitation/contraction coupling, points to the importance of the signaling pathways involved in this process. The release and uptake of cytosolic Ca^{2+} by the sarcoplasmic reticulum plays an integral role in each cycle of cardiac contraction and excitation (Minamisawa *et al.*, 1999, *Cell*, 99, 313-322). The process of Ca^{2+} reuptake is mediated by the cardiac sarcoplasmic reticulum Ca^{2+} ATPase (SERCA2a). SERCA2a activity is regulated by phospholamban, a p52 muscle specific sarcoplasmic reticulum phosphoprotein (Koss *et al.*, 1996, *Circ. Res.*, 79, 1059-1063, and Simmerman *et al.*, 1998, *Physiol. Rev.*, 78, 921-947). In its active, unphosphorylated state, phospholamban is a potent inhibitor of SERCA2a activity. Phosphorylation of phospholamban at serine 16 by cyclic AMP-dependent protein kinase (PKA) or calmodulin kinase, results in the inhibition of phospholamban interaction with SERCA2a. This phosphorylation event is predominantly responsible for the proportional increase in the rate of Ca^{2+} uptake into the sarcoplasmic reticulum and resultant ventricular relaxation (Tada *et al.*, 1982, *Mol. Cell. Biochem.*, 46, 73-95, and Luo *et al.*, 1998, *J. Biol. Chem.*, 273, 4734-4739).

Since a proportional decrease in Ca^{2+} uptake is a hallmark feature of heart failure (Sordahl *et al.*, 1973, *Am. J. Physiol.*, 224, 497-502) and since an increase in the relative ratio of phospholamban to SERCA2a is an important determinant of sarcoplasmic reticulum dysfunction in heart failure (Hasenfuss, 1998, *Cardiovasc. Res.*, 37, 279-289), the targeting of phospholamban and related regulatory factors as therapeutic targets for heart disorders should prove valuable for cardiac indications.

Pystynen *et al.*, International PCT publication No. WO 99/00132, describe bisethers of 1-oxa, aza and thianaphthalen-2-ones as small molecule inhibitors of phospholamban for increasing coronary flow via direct dilation of the coronary arteries.

Pystynen *et al.*, International PCT publication No. WO 99/15523, describe bisethers of 1-oxa, aza and thianaphthalen-2-ones as small molecule inhibitors of phospholamban that are useful for treating heart failure.

The efficacy of the above mentioned treatment strategies is limited. Small molecule inhibition of a molecular target is often limited by toxicity, which can restrict dosing and overall efficacy.

He *et al.*, 1999, *Circulation*, 100, 974-980, describe endogenous expression of mutant phospholamban and phospholamban antisense RNA to investigate the corresponding effect on SERCA2a activity and cardiac myocyte contractility.

- A more attractive approach to the treatment of heart disease would involve the use of
- 5 ribozymes and/or antisense constructs to modulate the expression of target molecules involved in heart failure. The use of nucleic acid molecules of the instant invention permits highly specific regulation of the molecular targets of interest, including phospholamban (PLN) (GenBank accession No. NM_002667), sarcolipin (SLN) (GenBank accession No. NM_003063), angiotensin II receptor (GenBank accession No.
- 10 U20860), endothelin 1 receptor (GenBank accession No. NM_001957), K-ras (GenBank accession No. NM_004985), p38 (GenBank accession No. AF092535), c-jun N-terminal kinase (GenBank accession No. NM_002750, L31951, NM_002753), growth hormone receptor (GenBank accession No. NM_000163), insulin-like growth factor I receptor (GenBank accession No. NM_000875), beta-1-adrenergic receptor (GenBank accession
- 15 No. NM_000024), β 1-adrenergic receptor kinase (GenBank accession No. NM_001619, NM_005160), VEGF receptor (GenBank accession No. U43368, M27281 X15997), fibroblast growth factor 5 (GenBank accession No. NM_004464), cardiotrophin I (GenBank accession No. NM_001330), neuregulin (GenBank accession No. AF009227), TNF-alpha (GenBank accession No. X02910 X02159), PI3 kinase (GenBank accession
- 20 No. NM_006218, NM_006219, U86453, NM_002649, M61906), and AKT kinase (GenBank accession No. NM_005163, M77198).

- Various methods have been developed to assay phospholamban activity *in vitro* and *in vivo*. Holt *et al.*, 1999, *J. Mol. Cell. Cardiol.*, 31, 645-656, describe a cell culture model in which thyroid hormone control of contraction and the Ca^{2+} -ATPase/phospholamban
- 25 complex is studied in adult rat ventricular myocytes. Slack *et al.* 1997, *J. Biol. Chem.*, 272, 18862-18868, describe studies in which the ectopic expression of phospholamban in mouse fast-twitch skeletal muscle cells alters sarcoplasmic reticulum Ca^{2+} transport and muscle relaxation. MacLennan *et al.*, 1996, *Soc. Gen. Physiol. Ser.*, 51, 89-103, in a review of regulatory interactions between calcium ATPases and phospholamban describe
- 30 phospholamban/ Ca^{2+} -ATPase interactions in protein expressed in heterologous cell culture experiments. Cornwell *et al.*, 1991, *Mol. Pharmacol.*, 40, 923-931, describe the

regulation of sarcoplasmic reticulum protein phosphorylation by localized cyclic GMP-dependent protein kinase in vascular smooth muscle cells.

- Minamisawa *et al.*, 1999, *Cell*, 99, 313-322, describe a phospholamban knockout mouse model which affords protection from induced dilated cardiomyopathy.
- 5 *Dillmann et al.*, 1999, *Am. J. Cardiol.*, 83, 89H-91H, describe a transgenic rat model for the study of altered expression of calcium regulatory proteins, including phospholamban, and their effect on myocyte contractile response.
- LekanneDeprez et al.*, 1998, *J. Mol. Cell. Cardiol.*, 30, 1877-1888, describe a rat pressure-overload model to investigate alterations in gene expression of phospholamban, atrial natriuretic peptide (ANP), sarcoplasmic
- 10 endoplasmic reticular calcium ATPase 2 (SERCA2), collagen III α 1, and calsequestrin (CSQ).
- Jones et al.*, 1998, *J. Clin. Invest.*, 101, 1385-1393, describe a mouse model for investigating the regulation of calcium signaling in transgenic mouse cardiac myocytes overexpressing calsequestrin. In this study, the upregulation and downregulation of calcium uptake and release proteins were determined, including phospholamban.
- 15 *Lorenz et al.*, 1997, *Am J. Physiol.*, 273, 6, describe a mouse model for the study of regulatory effects of phospholamban on cardiac function in intact mice. This study makes use of animal models with altered levels of phospholamban to permit *in vivo* evaluation of the physiological role of phospholamban.
- Arai et al.*, 1996, *Saishin Igaku*, 51, 1095-1104, presents a review article of gene targeted animal models expressing cardiovascular
- 20 abnormalities. The study of phospholamban and other protein expression modification effects in mice is presented.
- Wankerl et al.*, 1995, *J. Mol. Med.*, 73, 487-496, presents a review article describing the study of calcium transport proteins in the nonfailing and failing heart. Animal models investigating the major calcium handling myocardial proteins, including phospholamban, are described. These models, as well as others, may
- 25 be used to evaluate the effect of treatment with nucleic acid molecules of the instant invention on cardiac function. Endpoints may be, but are not limited to, left ventricular pressure, left ventricular pressure as a function of time (LVdP/dt), and mean arterial blood pressure. Endpoints will be evaluated under basal and stimulated (cardiac load) conditions.
- 30 Particular degenerative and disease states that can be associated with phospholamban expression modulation include but are not limited to congestive heart failure, heart failure, dilated cardiomyopathy and pressure overload hypertrophy:

Digoxin, Bendroflumazide, Dofetilide, and Carvedilol are non-limiting examples of pharmaceutical agents that can be combined with or used in conjunction with the nucleic acid molecules (e.g. ribozymes and antisense molecules) of the instant invention. Those skilled in the art will recognize that other drugs such as diuretic and antihypertensive compounds and therapies can be similarly be readily combined with the nucleic acid molecules of the instant invention (e.g. ribozymes and antisense molecules) are hence within the scope of the instant invention.

Identification of Potential Target Sites in Human phospholamban RNA

- 10 The sequence of human phospholamban was screened for accessible sites using a computer folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in **Tables 24-30**.

15 Selection of Enzymatic Nucleic Acid Cleavage Sites in Human phospholamban RNA

Ribozyme target sites were chosen by analyzing sequences of Human phospholamban (Genbank sequence accession number: NM_002667) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*, 1994 *J. Mol. Struct. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, **86**, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted below, varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes and Antisense for Efficient Cleavage and/or blocking of phospholamban RNA

- 30 Ribozymes and antisense constructs were designed to anneal to various sites in the RNA message. The binding arms of the ribozymes are complementary to the target site sequences described above, while the antisense constructs are fully complimentary to the target site sequences described above. The ribozymes and antisense constructs were

chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman et al., (1987 J. Am. Chem. Soc., 109, 7845), Scaringe et al., (1990 Nucleic Acids Res., 18, 5433) and Wincott et al., *supra*, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

Ribozymes and antisense constructs were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, Methods Enzymol. 180, 51). Ribozymes and antisense constructs were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; see Wincott et al., *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes and antisense constructs used in this study are shown below in **Table 24-30**.

Ribozyme Cleavage of phospholamban RNA Target *in vitro*

Ribozymes targeted to the human phospholamban RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for example using the following procedure. The target sequences and the nucleotide location within the phospholamban RNA are given in **Tables 24-30**.

Cleavage Reactions: Full-length or partially full-length, internally-labeled target RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α - 32 P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates are 5'- 32 P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess. The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM

EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is determined by Phosphor Imager[®] quantitation of bands representing the intact substrate and the cleavage products.

Tissue distribution of BrdU-labeled antisense in mice

CD1 mice were injected with a single bolus (30 mg/kg) of a BrdU-labeled antisense oligonucleotide or a similar molar amount of BrdU (as a control). At various time points (30 min, 2h and 6 h), mice were sacrificed and major tissues isolated and fixed. Distribution of antisense oligonucleotides was determined by probing with an anti-BrdU antibody and immunohistochemical staining. Tissue slices were probed with an anti-BrdU antibody followed by a reporter enzyme-conjugated second antibody and finally an enzyme substrate. Visualization of the colored product by microscopy indicated nuclear staining, demonstrating effective distribution of antisense oligonucleotide in cardiac tissue.

Tissue distribution of BrdU-labeled ribozymes in monkey

Rhesus monkeys were dosed with BrdU-labeled ribozyme by intravenous bolus injection at 0.1, 1.0, and 10 mg/kg once daily over five days. Saline injection was used in control animals. Animals were sacrificed and major tissues isolated and fixed. Tissue samples were probed with an anti-BrdU antibody followed by a reporter enzyme-conjugated second antibody and finally an enzyme substrate. Significant quantities of chemically modified ribozyme are detected in cardiac tissue following this dosing regimen.

Example 6: HBV

Chronic hepatitis B is caused by an enveloped virus, commonly known as the hepatitis B virus or HBV. HBV is transmitted via infected blood or other body fluids, especially saliva and semen, during delivery, sexual activity, or sharing of needles contaminated by infected blood. Individuals may be "carriers" and transmit the infection to others without ever having experienced symptoms of the disease. Persons at highest

risk are those with multiple sex partners, those with a history of sexually transmitted diseases, parenteral drug users, infants born to infected mothers, "close" contacts or sexual partners of infected persons, and healthcare personnel or other service employees who have contact with blood. Transmission is also possible via tattooing, ear or body piercing, and acupuncture; the virus is also stable on razors, toothbrushes, baby bottles, eating utensils, and some hospital equipment such as respirators, scopes and instruments. There is no evidence that HBsAg positive food handlers pose a health risk in an occupational setting, nor should they be excluded from work. Hepatitis B has never been documented as being a food-borne disease. The average incubation period is 60 to 90 days, with a range of 45 to 180; the number of days appears to be related to the amount of virus to which the person was exposed. However, determining the length of incubation is difficult, since onset of symptoms is insidious. Approximately 50% of patients develop symptoms of acute hepatitis that last from 1 to 4 weeks. Two percent or less of these individuals develop fulminant hepatitis resulting in liver failure and death.

The determinants of severity include: (1) The size of the dose to which the person was exposed; (2) the person's age with younger patients experiencing a milder form of the disease; (3) the status of the immune system with those who are immunosuppressed experiencing milder cases; and (4) the presence or absence of co-infection with the Delta virus (hepatitis D), with more severe cases resulting from co-infection. In symptomatic cases, clinical signs include loss of appetite, nausea, vomiting, abdominal pain in the right upper quadrant, arthralgia, and tiredness/loss of energy. Jaundice is not experienced in all cases, however, jaundice is more likely to occur if the infection is due to transfusion or percutaneous serum transfer, and it is accompanied by mild pruritus in some patients. Bilirubin elevations are demonstrated in dark urine and clay-colored stools, and liver enlargement may occur accompanied by right upper-quadrant pain. The acute phase of the disease may be accompanied by severe depression, meningitis, Guillain-Barré syndrome, myelitis, encephalitis, agranulocytosis, and/or thrombocytopenia.

Hepatitis B is generally self-limiting and will resolve in approximately 6 months. Asymptomatic cases can be detected by serologic testing, since the presence of the virus leads to production of large amounts of HBsAg in the blood. This antigen is the first and most useful diagnostic marker for active infections. However, if HBsAg remains positive for 20 weeks or longer, the person is likely to remain positive indefinitely and is now a

carrier. While only 10% of persons over age 6 who contract HBV become carriers, 90% of infants infected during the first year of life do so.

- Hepatitis B virus (HBV) infects over 300 million people worldwide (Imperial, 1999, *Gastroenterol. Hepatol.*, 14 (suppl), S1-5). In the United States approximately 1.25 million individuals are chronic carriers of HBV as evidenced by the fact that they have measurable hepatitis B virus surface antigen HBsAg in their blood. The risk of becoming a chronic HBsAg carrier is dependent upon the mode of acquisition of infection as well as the age of the individual at the time of infection. For those individuals with high levels of viral replication, chronic active hepatitis with progression to cirrhosis, liver failure and hepatocellular carcinoma (HCC) is common, and liver transplantation is the only treatment option for patients with end-stage liver disease from HBV.

- The natural progression of chronic HBV infection over a 10 to 20 year period leads to cirrhosis in 20-to-50% of patients and progression of HBV infection to hepatocellular carcinoma has been well documented. There have been no studies that have determined sub-populations that are most likely to progress to cirrhosis and/or hepatocellular carcinoma, thus all patients have equal risk of progression.

- It is important to note that the survival for patients diagnosed with hepatocellular carcinoma is only 0.9 to 12.8 months from initial diagnosis (Takahashi *et al.*, 1993, *American Journal of Gastroenterology*, 88, 240-243). Treatment of hepatocellular carcinoma with chemotherapeutic agents has not proven effective and only 10% of patients will benefit from surgery due to extensive tumor invasion of the liver (Trinchet *et al.*, 1994, *Presse Medicines*, 23, 831-833). Given the aggressive nature of primary hepatocellular carcinoma, the only viable treatment alternative to surgery is liver transplantation (Pichlmayr *et al.*, 1994, *Hepatology.*, 20, 33S-40S).

- Upon progression to cirrhosis, patients with chronic HCV infection present with clinical features, which are common to clinical cirrhosis regardless of the initial cause (D'Amico *et al.*, 1986, *Digestive Diseases and Sciences*, 31, 468-475). These clinical features may include: bleeding esophageal varices, ascites, jaundice, and encephalopathy (Zakim D, Boyer TD. *Hepatology a textbook of liver disease*, Second Edition Volume 1. 1990 W.B. Saunders Company. Philadelphia). In the early stages of cirrhosis, patients are classified as compensated, meaning that although liver tissue damage has occurred, the patient's liver is still able to detoxify metabolites in the blood-stream. In addition, most

patients with compensated liver disease are asymptomatic and the minority with symptoms report only minor symptoms such as dyspepsia and weakness. In the later stages of cirrhosis, patients are classified as decompensated meaning that their ability to detoxify metabolites in the bloodstream is diminished and it is at this stage that the clinical features described above will present.

In 1986, D'Amico *et al.* described the clinical manifestations and survival rates in 1155 patients with both alcoholic and viral associated cirrhosis (D'Amico *supra*). Of the 1155 patients, 435 (37%) had compensated disease although 70% were asymptomatic at the beginning of the study. The remaining 720 patients (63%) had decompensated liver disease with 78% presenting with a history of ascites, 31% with jaundice, 17% had bleeding and 16% had encephalopathy. Hepatocellular carcinoma was observed in six (0.5%) patients with compensated disease and in 30 (2.6%) patients with decompensated disease.

Over the course of six years, the patients with compensated cirrhosis developed clinical features of decompensated disease at a rate of 10% per year. In most cases, ascites was the first presentation of decompensation. In addition, hepatocellular carcinoma developed in 59 patients who initially presented with compensated disease by the end of the six-year study.

With respect to survival, the D'Amico study indicated that the five-year survival rate for all patients on the study was only 40%. The six-year survival rate for the patients who initially had compensated cirrhosis was 54% while the six-year survival rate for patients who initially presented with decompensated disease was only 21%. There were no significant differences in the survival rates between the patients who had alcoholic cirrhosis and the patients with viral related cirrhosis. The major causes of death for the patients in the D'Amico study were liver failure in 49%; hepatocellular carcinoma in 22%; and, bleeding in 13% (D'Amico *supra*).

Hepatitis B virus is a double-stranded circular DNA virus. It is a member of the Hepadnaviridae family. The virus consists of a central core that contains a core antigen (HBcAg) surrounded by an envelope containing a surface protein/surface antigen (HBsAg) and is 42 nm in diameter. It also contains an e antigen (HBeAg) which, along with HBcAg and HBsAg, is helpful in identifying this disease

In HBV virions, the genome is found in an incomplete double-stranded form. HBV uses a reverse transcriptase to transcribe a positive-sense full length RNA version of its genome back into DNA. This reverse transcriptase also contains DNA polymerase activity and thus begins replicating the newly synthesized minus-sense DNA strand. However, it appears that the core protein encapsidates the reverse-transcriptase/polymerase before it completes replication.

From the free-floating form, the virus must first attach itself specifically to a host cell membrane. Viral attachment is one of the crucial steps which determines host and tissue specificity. However, currently there are no in vitro cell-lines that can be infected by HBV. There are some cells lines, such as HepG2, which can support viral replication only upon transient or stable transfection using HBV DNA.

After attachment, fusion of the viral envelope and host membrane must occur to allow the viral core proteins containing the genome and polymerase to enter the cell. Once inside, the genome is translocated to the nucleus where it is repaired and cyclized.

The complete closed circular DNA genome of HBV remains in the nucleus and gives rise to four transcripts. These transcripts initiate at unique sites but share the same 3'-ends. The 3.5-kb pregenomic RNA serves as a template for reverse transcription and also encodes the nucleocapsid protein and polymerase. A subclass of this transcript with a 5'-end extension codes for the precore protein that, after processing, is secreted as HBV e antigen. The 2.4-kb RNA encompasses the pre-S1 open reading frame (ORF) that encodes the large surface protein. The 2.1-kb RNA encompasses the pre-S2 and S ORFs that encode the middle and small surface proteins, respectively. The smallest transcript (~0.8-kb) codes for the X protein, a transcriptional activator.

Multiplication of the HBV genome begins within the nucleus of an infected cell. RNA polymerase II transcribes the circular HBV DNA into greater-than-full length mRNA. Since the mRNA is longer than the actual complete circular DNA, redundant ends are formed. Once produced, the pregenomic RNA exits the nucleus and enters the cytoplasm.

The packaging of pregenomic RNA into core particles is triggered by the binding of the HBV polymerase to the 5' epsilon stem-loop. RNA encapsidation is believed to occur as soon as binding occurs. The HBV polymerase also appears to require associated core protein in order to function. The HBV polymerase initiates reverse transcription from the

5' epsilon stem-loop three to four base pairs at which point the polymerase and attached nascent DNA are transferred to the 3' copy of the DR1 region. Once there, the (-)DNA is extended by the HBV polymerase while the RNA template is degraded by the HBV polymerase RNase H activity. When the HBV polymerase reaches the 5' end, a small stretch of RNA is left undigested by the RNase H activity. This segment of RNA is comprised of a small sequence just upstream and including the DR1 region. The RNA oligomer is then translocated and annealed to the DR2 region at the 5' end of the (-)DNA. It is used as a primer for the (+)DNA synthesis which is also generated by the HBV polymerase. It appears that the reverse transcription as well as plus strand synthesis may occur in the completed core particle.

Since the pregenomic RNA is required as a template for DNA synthesis, this RNA is an excellent target for ribozyme cleavage. Nucleoside analogues that have been documented to inhibit HBV replication target the reverse transcriptase activity needed to convert the pregenomic RNA into DNA. Ribozyme cleavage of the pregenomic RNA template would be expected to result in a similar inhibition of HBV replication. Further, targeting the 3'-end of the pregenomic RNA that is common to all HBV transcripts could result in reduction of all HBV gene products and an additional level of inhibition of HBV replication.

As previously mentioned, HBV does not infect cells in culture. However, transfection of HBV DNA (either as a head-to-tail dimer or as an "overlength" genome of >100%) into Huh7 or Hep G2 hepatocytes results in viral gene expression and production of HBV virions released into the media. Thus, HBV replication competent DNA would be co-transfected with ribozymes in cell culture. Such an approach has been used to report intracellular ribozyme activity against HBV (zu Putlitz, *et al.*, 1999, *J. Virol.*, 73, 5381-5387, and Kim *et al.*, 1999, *Biochem. Biophys. Res. Commun.*, 257, 759-765). In addition, stable hepatocyte cell lines have been generated that express HBV. In these cells only ribozyme would need to be delivered; however, a delivery screen would need to be performed. In addition, stable hepatocyte cell lines have been generated that express HBV.

Intracellular HBV gene expression can be assayed by a Taqman® assay for HBV RNA or by ELISA for HBV protein. Extracellular virus can be assayed by PCR for DNA or ELISA for protein. Antibodies are commercially available for HBV surface antigen and

core protein. A secreted alkaline phosphatase expression plasmid can be used to normalize for differences in transfection efficiency and sample recovery.

There are several small animal models to study HBV replication. One is the transplantation of HBV-infected liver tissue into irradiated mice. Viremia (as evidenced by measuring HBV DNA by PCR) is first detected 8 days after transplantation and peaks between 18 – 25 days (Ilan *et al.*, 1999, *Hepatology*, 29, 553-562).

Transgenic mice that express HBV have also been used as a model to evaluate potential anti-virals. HBV DNA is detectable in both liver and serum (Morrey *et al.*, 1999, *Antiviral Res.*, 42, 97-108).

An additional model is to establish subcutaneous tumors in nude mice with Hep G2 cells transfected with HBV. Tumors develop in about 2 weeks after inoculation and express HBV surface and core antigens. HBV DNA and surface antigen is also detected in the circulation of tumor-bearing mice (Yao *et al.*, 1996, *J. Viral Hepat.*, 3, 19-22).

Woodchuck hepatitis virus (WHV) is closely related to HBV in its virus structure, genetic organization, and mechanism of replication. As with HBV in humans, persistent WHV infection is common in natural woodchuck populations and is associated with chronic hepatitis and hepatocellular carcinoma (HCC). Experimental studies have established that WHV causes HCC in woodchucks and woodchucks chronically infected with WHV have been used as a model to test a number of anti-viral agents. For example, the nucleoside analogue 3T3 was observed to cause dose dependent reduction in virus (50% reduction after two daily treatments at the highest dose) (Hurwitz *et al.*, 1998, *Antimicrob. Agents Chemother.*, 42, 2804-2809).

Current therapeutic goals of treatment are three-fold: to eliminate infectivity and transmission of HBV to others, to arrest the progression of liver disease and improve the clinical prognosis, and to prevent the development of hepatocellular carcinoma (HCC).

Interferon alpha use is the most common therapy for HBV; however, recently Lamivudine (3TC) has been approved by the FDA. Interferon alpha (IFN-alpha) is one treatment for chronic hepatitis B. The standard duration of IFN-alpha therapy is 16 weeks, however, the optimal treatment length is still poorly defined. A complete response (HBV DNA negative/HBeAg negative) occurs in approximately 25% of patients. Several factors have been identified that predict a favorable response to therapy including: High ALT, low HBV DNA, being female, and heterosexual orientation.

There is also a risk of reactivation of the hepatitis B virus even after a successful response, this occurs in around 5% of responders and normally occurs within 1 year.

Side effects resulting from treatment with type 1 interferons can be divided into four general categories including: Influenza-like symptoms, neuropsychiatric, laboratory abnormalities, and other miscellaneous side effects. Examples of influenza-like symptoms include, fatigue, fever, myalgia, malaise, appetite loss, tachycardia, rigors, headache and arthralgias. The influenza-like symptoms are usually short-lived and tend to abate after the first four weeks of dosing (Dusheiko *et al.*, 1994, *Journal of Viral Hepatitis*, 1, 3-5). Neuropsychiatric side effects include irritability, apathy, mood changes, insomnia, cognitive changes, and depression. Laboratory abnormalities include the reduction of myeloid cells, including granulocytes, platelets and to a lesser extent, red blood cells. These changes in blood cell counts rarely lead to any significant clinical sequelae. In addition, increases in triglyceride concentrations and elevations in serum alanine and aspartate aminotransferase concentration have been observed. Finally, thyroid abnormalities have been reported. These thyroid abnormalities are usually reversible after cessation of interferon therapy and can be controlled with appropriate medication while on therapy. Miscellaneous side effects include nausea, diarrhea, abdominal and back pain, pruritus, alopecia, and rhinorrhea. In general, most side effects will abate after 4 to 8 weeks of therapy (Dushieko *et al.*, *supra*).

Lamivudine (3TC) is a nucleoside analogue, which is a very potent and specific inhibitor of HBV DNA synthesis. Lamivudine has recently been approved for the treatment of chronic Hepatitis B. Unlike treatment with interferon, treatment with 3TC does not eliminate the HBV from the patient. Rather, viral replication is controlled and chronic administration results in improvements in liver histology in over 50% of patients. Phase III studies with 3TC, showed that treatment for one year was associated with reduced liver inflammation and a delay in scarring of the liver. In addition, patients treated with Lamivudine (100mg per day) had a 98 percent reduction in hepatitis B DNA and a significantly higher rate of seroconversion, suggesting disease improvements after completion of therapy. However, stopping of therapy resulted in a reactivation of HBV replication in most patients. In addition recent reports have documented 3TC resistance in approximately 30% of patients.

Particular degenerative and disease states that can be associated with HBV expression modulation include but are not limited to, HBV infection, hepatitis, cancer, tumorigenesis, cirrhosis, liver failure and others.

Lamivudine (3TC), L-FMAU, adefovir dipivoxil, type 1 Interferon, therapeutic vaccines, steroids, and 2'-5' Oligoadenylates are non-limiting examples of pharmaceutical agents that can be combined with or used in conjunction with the nucleic acid molecules (e.g. ribozymes and antisense molecules) of the instant invention. Those skilled in the art will recognize that other drugs such as diuretic and antihypertensive compounds or other therapies can similarly and readily be combined with the nucleic acid molecules of the instant invention (e.g. ribozymes and antisense molecules) and are, therefore, within the scope of the instant invention.

Current therapies for treating HBV infection, including interferon and nucleoside analogues, are only partially effective. In addition, drug resistance to nucleoside analogues is now emerging, making treatment of chronic Hepatitis B more difficult. Thus, a need exists for effective treatment of this disease which utilizes antiviral inhibitors which work by mechanisms other than those currently utilized in the treatment of both acute and chronic hepatitis B infections.

Draper, US patent No. 6,017,756, describes the use of ribozymes for the inhibition of Hepatitis B Virus.

Passman *et al.*, 2000, *Biochem. Biophys. Res. Commun.*, 268(3), 728-733.; Gan *et al.*, 1998, *J. Med. Coll. PLA*, 13(3), 157-159.; Li *et al.*, 1999, *Jiefangjun Yixue Zazhi*, 24(2), 99-101.; Putlitz *et al.*, 1999, *J. Virol.*, 73(7), 5381-5387.; Kim *et al.*, 1999, *Biochem. Biophys. Res. Commun.*, 257(3), 759-765.; Xu *et al.*, 1998, *Bingdu Xuebao*, 14(4), 365-369.; Welch *et al.*, 1997, *Gene Ther.*, 4(7), 736-743.; Goldenberg *et al.*, 1997, International PCT publication No. WO 97/08309, Wands *et al.*, 1997, *J. of Gastroenterology and Hepatology*, 12(suppl.), S354-S369.; Ruiz *et al.*, 1997, *BioTechniques*, 22(2), 338-345.; Gan *et al.*, 1996, *J. Med. Coll. PLA*, 11(3), 171-175.; Beck and Nassal, 1995, *Nucleic Acids Res.*, 23(24), 4954-62.; Goldenberg, 1995, International PCT publication No. WO 95/22600.; Xu *et al.*, 1993, *Bingdu Xuebao*, 9(4), 331-6.; Wang *et al.*, 1993, *Bingdu Xuebao*, 9(3), 278-80, all describe ribozymes that are targeted to cleave a specific HBV target site.

The enzymatic nucleic acid molecules of the instant invention exhibit a high degree of specificity for only the viral mRNA in infected cells. Nucleic acid molecules of the instant invention targeted to highly conserved sequence regions allow the treatment of many strains of human HBV with a single compound. No treatment presently exists which specifically attacks expression of the viral gene(s) that are responsible for transformation of hepatocytes by HBV.

The methods of this invention can be used to treat human hepatitis B virus infections, which include productive virus infection, latent or persistent virus infection, and HBV-induced hepatocyte transformation. The utility can be extended to other species of HBV which infect non-human animals where such infections are of veterinary importance.

Preferred target sites are genes required for viral replication, a non-limiting example includes genes for protein synthesis, such as the 5' most 1500 nucleotides of the HBV pregenomic mRNAs. For sequence references, see Renbao *et al.*, 1987, *Sci. Sin.*, 30, 507. This region controls the translational expression of the core protein (C), X protein (X) and DNA polymerase (P) genes and plays a role in the replication of the viral DNA by serving as a template for reverse transcriptase. Disruption of this region in the RNA results in deficient protein synthesis as well as incomplete DNA synthesis (and inhibition of transcription from the defective genomes). Target sequences 5' of the encapsidation site can result in the inclusion of the disrupted 3' RNA within the core virion structure and targeting sequences 3' of the encapsidation site can result in the reduction in protein expression from both the 3' and 5' fragments.

Alternative regions outside of the 5' most 1500 nucleotides of the pregenomic mRNA also make suitable targets of enzymatic nucleic acid mediated inhibition of HBV replication. Such targets include the mRNA regions that encode the viral S gene. Selection of particular target regions will depend upon the secondary structure of the pregenomic mRNA. Targets in the minor mRNAs can also be used, especially when folding or accessibility assays in these other RNAs reveal additional target sequences that are unavailable in the pregenomic mRNA species.

A desirable target in the pregenomic RNA is a proposed bipartite stem-loop structure in the 3'-end of the pregenomic RNA which is believed to be critical for viral replication (Kidd and Kidd-Ljunggren, 1996. *Nuc. Acid Res.* 24:3295-3302). The 5' end of the HBV

pregenomic RNA carries a *cis*-acting encapsidation signal, which has inverted repeat sequences that are thought to form a bipartite stem-loop structure. Due to a terminal redundancy in the pregenomic RNA, the putative stem-loop also occurs at the 3'-end. While it is the 5' copy which functions in polymerase binding and encapsidation, reverse transcription actually begins from the 3' stem-loop. To start reverse transcription, a 4 nt primer which is covalently attached to the polymerase is made, using a bulge in the 5' encapsidation signal as template. This primer is then shifted, by an unknown mechanism, to the DR1 primer binding site in the 3' stem-loop structure, and reverse transcription proceeds from that point. The 3' stem-loop, and especially the DR1 primer binding site, appear to be highly effective targets for ribozyme intervention.

Sequences of the pregenomic RNA are shared by the mRNAs for surface, core, polymerase, and X proteins. Due to the overlapping nature of the HBV transcripts, all share a common 3'-end. Ribozyme targeting this common 3'-end will thus cleave the pregenomic RNA as well as all of the mRNAs for surface, core, polymerase and X proteins.

In preferred embodiments, the invention features a method for the analysis of HBV proteins. This method is useful in determining the efficacy of HBV inhibitors. Specifically, the instant invention features an assay for the analysis of HBsAg proteins and secreted alkaline phosphatase (SEAP) control proteins to determine the efficacy of agents used to modulate HBV expression.

The method consists of coating a micro-titer plate with an antibody such as anti-HBsAg Mab (for example, Biostride B88-95-31ad,ay) at 0.1 to 10 µg/ml in a buffer (for example, carbonate buffer, such as Na₂CO₃ 15 mM, NaHCO₃ 35 mM, pH 9.5) at 4°C overnight. The microtiter wells are then washed with PBST or the equivalent thereof, (for example, PBS, 0.05% Tween 20) and blocked for 0.1-24 hr at 37° C with PBST, 1% BSA or the equivalent thereof. Following washing as above, the wells are dried (for example, at 37° C for 30 min). Biotinylated goat anti-HBsAg or an equivalent antibody (for example, Accurate YVS1807) is diluted (for example at 1:1000) in PBST and incubated in the wells (for example, 1 hr. at 37° C). The wells are washed with PBST (for example, 4x). A conjugate, (for example, Streptavidin/Alkaline Phosphatase Conjugate, Pierce 21324) is diluted to 10-10,000 ng/ml in PBST, and incubated in the wells (for example, 1 hr. at 37° C). After washing as above, a substrate (for example, p-nitrophenyl phosphate substrate,

Pierce 37620) is added to the wells, which are then incubated (for example, 1 hr. at 37° C). The optical density is then determined (for example, at 405 nm). SEAP levels are then assayed, for example, using the Great EscAPE® Detection Kit (Clontech K2041-1), as per the manufacturers instructions. In the above example, incubation times and reagent concentrations may be varied to achieve optimum results, a non-limiting example is described in Example 6.

Comparison of this HBsAg ELISA method to a commercially available assay from World Diagnostics, Inc. 15271 NW 60th Ave, #201, Miami Lakes, FL 33014 (305) 827-3304 (Cat. No. EL10018) demonstrates an increase in sensitivity (signal:noise) of 3-20 fold.

Identification of Potential Target Sites in Human HBV RNA

The sequence of human HBV was screened for accessible sites using a computer-folding algorithm. Regions of the RNA that did not form secondary folding structures and contained potential ribozyme and/or antisense binding/cleavage sites were identified. The sequences of these cleavage sites are shown in Tables 36-43.

Selection of Enzymatic Nucleic Acid Cleavage Sites in Human HBV RNA

Ribozyme target sites were chosen by analyzing sequences of Human HBV (accession number: AF100308.1) and prioritizing the sites on the basis of folding. Ribozymes were designed that could bind each target and were individually analyzed by computer folding (Christoffersen *et al.*, 1994 *J. Mol. Struc. Theochem*, 311, 273; Jaeger *et al.*, 1989, *Proc. Natl. Acad. Sci. USA*, 86, 7706) to assess whether the ribozyme sequences fold into the appropriate secondary structure. Those ribozymes with unfavorable intramolecular interactions between the binding arms and the catalytic core were eliminated from consideration. As noted herein, varying binding arm lengths can be chosen to optimize activity. Generally, at least 5 bases on each arm are able to bind to, or otherwise interact with, the target RNA.

Chemical Synthesis and Purification of Ribozymes and Antisense for Efficient Cleavage and/or blocking of HBV RNA

Ribozymes and antisense constructs were designed to anneal to various sites in the RNA message. The binding arms of the ribozymes are complementary to the target site sequences described above, while the antisense constructs are fully complementary to the target site sequences described above. The ribozymes and antisense constructs were chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman et al., (1987 *J. Am. Chem. Soc.*, 109, 7845), Scaringe et al., (1990 *Nucleic Acids Res.*, 18, 5433) and Wincott et al., *supra*, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were typically >98%.

Ribozymes and antisense constructs were also synthesized from DNA templates using bacteriophage T7 RNA polymerase (Milligan and Uhlenbeck, 1989, *Methods Enzymol.* 180, 51). Ribozymes and antisense constructs were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; see Wincott et al., *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes used in this study are shown below in **Table 43**.

Ribozyme Cleavage of HBV RNA Target *in vitro*

Ribozymes targeted to the human HBV RNA are designed and synthesized as described above. These ribozymes can be tested for cleavage activity *in vitro*, for example using the following procedure. The target sequences and the nucleotide location within the HBV RNA are given in **Tables 36-43**.

Cleavage Reactions: Full-length or partially full-length, internally-labeled target RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α -³²P] CTP, passed over a G 50 Sephadex® column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates are 5'-³²P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH 7.5

- at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of either 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess.
- 5 The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is
- 0 determined by Phosphor Imager[®] quantitation of bands representing the intact substrate and the cleavage products.

Transfection of HepG2 Cells with psHBV-1 and Ribozymes

- The human hepatocellular carcinoma cell line Hep G2 was grown in Dulbecco's modified Eagle media supplemented with 10% fetal calf serum, 2 mM glutamine, 0.1 mM nonessential amino acids, 1 mM sodium pyruvate, 25 mM Hepes, 100 units penicillin, and 100 µg/ml streptomycin. To generate a replication competent cDNA, prior to transfection the HBV genomic sequences are excised from the bacterial plasmid sequence contained in the psHBV-1 vector (Those skilled in the art understand that other methods may be used
- 5 to generate a replication competent cDNA). This was done with an EcoRI and Hind III restriction digest. Following completion of the digest, a ligation was performed under dilute conditions (20 µg/ml) to favor intermolecular ligation. The total ligation mixture was then concentrated using Qiagen spin columns.

- Secreted alkaline phosphatase (SEAP) was used to normalize the HBsAg levels to control for transfection variability. The pSEAP2-TK control vector was constructed by
- 5 ligating a Bgl II-Hind III fragment of the pRL-TK vector (Promega), containing the herpes simplex virus thymidine kinase promoter region, into Bgl II/Hind III digested pSEAP2-Basic (Clontech). Hep G2 cells were plated (3×10^4 cells/well) in 96-well microtiter plates and incubated overnight. A lipid/DNA/ribozyme complex was formed containing (at final
- 0 concentrations) cationic lipid (15 µg/ml), prepared psHBV-1 (4.5 µg/ml), pSEAP2-TK (0.5 µg/ml), and ribozyme (100 µM). Following a 15 min. incubation at 37°C, the

complexes were added to the plated Hep G2 cells. Media was removed from the cells 96 hr. post-transfection for HBsAg and SEAP analysis.

- Transfection of the human hepatocellular carcinoma cell line, Hep G2, with replication competent HBV DNA results in the expression of HBV proteins and the production of virions. To investigate the potential use of ribozymes for the treatment of chronic HBV infection, a series of ribozymes that target the 3' terminus of the HBV genome have been synthesized. Ribozymes targeting this region have the potential to cleave all four major HBV RNA transcripts as well as the potential to block the production of HBV DNA by cleavage of the pregenomic RNA. To test the efficacy of these HBV ribozymes, they were co-transfected with HBV genomic DNA into Hep G2 cells, and the subsequent levels of secreted HBV surface antigen (HBsAg) were analyzed by ELISA. To control for variability in transfection efficiency, a control vector which expresses secreted alkaline phosphatase (SEAP), was also co-transfected. The efficacy of the HBV ribozymes was determined by comparing the ratio of HBsAg:SEAP and/or HBeAg:SEAP to that of a scrambled attenuated control (SAC) ribozyme. Twenty-five ribozymes (RPII8341, RPII8356, RPII8363, RPII8364, RPII8365, RPII8366, RPII8367, RPII8368, RPII8369, RPII8370, RPII8371, RPII8372, RPII8373, RPII8374, RPII8303, RPII8405, RPII8406, RPII8407, RPII8408, RPII8409, RPII8410, RPII8411, RPII8418, RPII8419, and RPII8422) have been identified which cause a reduction in the levels of HBsAg and/or HBeAg as compared to the corresponding SAC ribozyme.

Example 6: Analysis of HBsAg and SEAP Levels Following Ribozyme Treatment

- Imulon 4 (Dynax) microtiter wells were coated overnight at 4° C with anti-HBsAg Mab (Biostride B88-95-31ad,ay) at 1 µg/ml in Carbonate Buffer (Na₂CO₃ 15 mM, NaHCO₃ 35 mM, pH 9.5). The wells were then washed 4x with PBST (PBS, 0.05% Tween® 20) and blocked for 1 hr at 37° C with PBST, 1% BSA. Following washing as above, the wells were dried at 37° C for 30 min. Biotinylated goat anti-HBsAg (Accurate YVSI807) was diluted 1:1000 in PBST and incubated in the wells for 1 hr. at 37° C. The wells were washed 4x with PBST. Streptavidin/Alkaline Phosphatase Conjugate (Pierce 21324) was diluted to 250 ng/ml in PBST, and incubated in the wells for 1 hr. at 37° C. After washing as above, p-nitrophenyl phosphate substrate (Pierce 37620) was added to the wells, which were then incubated for 1 hr. at 37° C. The optical density at 405 nm was

then determined. SEAP levels were assayed using the Great EscAPE® Detection Kit (Clontech K2041-1), as per the manufacturers instructions.

Example 7: X-gene Reporter Assay

- 5 The effect of ribozyme treatment on the level of transactivation of a SV40 promoter driven firefly luciferase gene by the HBV X-protein was analyzed in transfected Hep G2 cells. As a control for variability in transfection efficiency, a Renilla luciferase reporter driven by the TK promoter, which is not transactivated by the X protein, was used. Hep G2 cells were plated (3×10^4 cells/well) in 96-well microtiter plates and incubated
- 10 overnight. A lipid/DNA/ribozyme complex was formed containing (at final concentrations) cationic lipid (2.4 µg/ml), the X-gene vector pSBDP(2.5 µg/ml), the firefly reporter pSV40HCVluc (0.5 µg/ml), the Renilla luciferase control vector pRL-TK (0.5 µg/ml), and ribozyme (100 µM). Following a 15 min. incubation at 37° C, the complexes were added to the plated Hep G2 cells. Levels of firefly and Renilla luciferase were
- 15 analyzed 48 hr. post transfection, using Promega's Dual-Luciferase Assay System.

- The HBV X protein is a transactivator of a number of viral and cellular genes. Ribozymes which target the X region were tested for their ability to cause a reduction in X protein transactivation of a firefly luciferase gene driven by the SV40 promoter in transfected Hep G2 cells. As a control for transfection variability, a vector containing the
- 20 Renilla luciferase gene driven by the TK promoter, which is not activated by the X protein, was included in the co-transfections. The efficacy of the HBV ribozymes was determined by comparing the ratio of firefly luciferase: Renilla luciferase to that of a scrambled attenuated control (SAC) ribozyme. Eleven ribozymes (RPI18365, RPI18367, RPI18368, RPI18371, RPI18372, RPI18373, RPI18405, RPI18406, RPI18411, RPI18418, RPI18423)
- 25 were identified which cause a reduction in the level of transactivation of a reporter gene by the X protein, as compared to the corresponding SAC ribozyme.

Example 8: HBV transgenic mouse study

- A transgenic mouse strain (founder strain 1.3.32 with a C57B1/6 background) that
- 30 expresses HBV RNA and forms HBV viremia (Morrey *et al.*, 1999, *Antiviral Res.*, 42, 97-108; Guidotti *et al.*, 1995, *J. Virology*, 69, 10, 6158-6169) was utilized to study the *in vivo*

- activity of ribozymes of the instant invention. This model is predictive in screening for anti-HBV agents. Ribozyme or the equivalent volume of saline was administered via a continuous s.c. infusion using Alzet® mini-osmotic pumps for 14 days. Alzet® pumps were filled with test material(s) in a sterile fashion according to the manufacturer's instructions. Prior to *in vivo* implantation, pumps were incubated at 37°C overnight (≥ 18 hours) to prime the flow modulators. On the day of surgery, animals were lightly anesthetized with a ketamine/xylazine cocktail (94 mg/kg and 6 mg/kg, respectively; 0.3 ml, IP). Baseline blood samples (200 μ l) were obtained from each animal *via* a retro-orbital bleed. A 2 cm area near the base of the tail was shaved and cleansed with betadine surgical scrub and sequentially with 70% alcohol. A 1 cm incision in the skin was made with a #15 scalpel blade or a blunt pair of scissors near the base of the tail. Forceps were used to open a pocket rostrally (*i.e.*, towards the head) by spreading apart the subcutaneous connective tissue. The pump was inserted with the delivery portal pointing away from the incision. Wounds were closed with sterile 9-mm stainless steel clips or with sterile 4-0 suture. Animals were then allowed to recover from anesthesia on a warm heating pad before being returned to their cage. Wounds were checked daily. Clips or sutures were replaced as needed. Incisions typically healed completely within 7 days post-op. Animals were then deeply anesthetized with the ketamine/xylazine cocktail (150 mg/kg and 10 mg/kg, respectively; 0.5 ml, IP) on day 14 post pump implantation. A midline thoracotomy/ laparotomy was performed to expose the abdominal cavity and the thoracic cavity. The left ventricle was cannulated at the base and animals exsanguinated using a 23G needle and 1 ml syringe. Serum was separated, frozen and analyzed for HBV DNA and antigen levels. Experimental groups were compared to the saline control group in respect to percent change from day 0 to day 14. HBV DNA was assayed by quantitative PCR

Results

- Table 44** is a summary of the group designation and dosage levels used in the HBV transgenic mouse study. Baseline blood samples were obtained *via* a retroorbital bleed and animals (N=10/group) received anti-HBV ribozymes (100 mg/kg/day) as a continuous SC infusion. After 14 days, animals treated with a ribozyme targeting site 273 (RPL18341) of

the HBV RNA showed a significant reduction in serum HBV DNA concentration, compared to the saline treated animals as measured by a quantitative PCR assay. More specifically, the saline treated animals had a 69% increase in serum HBV DNA concentrations over this 2-week period while treatment with the 273 ribozyme

- 5 (RPL18341) resulted in a 60% decrease in serum HBV DNA concentrations. Ribozymes directed against sites 1833 (RPL18371), 1873 (RPL18418), and 1874 (RPL18372) decreased serum HBV DNA concentrations by 49%, 15% and 16%, respectively.

Example 7: Activity of NCH Ribozyme to inhibit HER2 gene expression

- 10 HER2 (also known as neu, erbB2 and c-erbB2) is an oncogene that encodes a 185-kDa transmembrane tyrosine kinase receptor. HER2 is a member of the epidermal growth factor receptor (EGFR) family and shares partial homology with other family members. In normal adult tissues HER2 expression is low. However, HER2 is overexpressed in at least 25-30% of breast (McGuire & Greene, 1989) and ovarian cancers (Berchuck, *et al.*, 1990).
- 5 Furthermore, overexpression of HER2 in malignant breast tumors has been correlated with increased metastasis, chemoresistance and poor survival rates (Slamon *et al.*, 1987 *Science* 235: 177-182). Because HER2 expression is high in aggressive human breast and ovarian cancers, but low in normal adult tissues, it is an attractive target for ribozyme-mediated therapy (Thompson *et al.*, *supra*).
- 10 The greatest HER2 specific effects have been observed in cancer cell lines that express high levels of HER2 protein (as measured by ELISA). Specifically, in one study that treated five human breast cancer cell lines with the HER2 antibody (anti-erbB2-sFv), the greatest inhibition of cell growth was seen in three cell lines (MDA-MB-361, SKBR-3 and BT-474) that express high levels of HER2 protein. No inhibition of cell growth was
- 15 observed in two cell lines (MDA-MB-231 and MCF-7) that express low levels of HER2 protein (Wright *et al.*, 1997). Another group successfully used SKBR-3 cells to show HER2 antisense oligonucleotide-mediated inhibition of HER2 protein expression and HER2 RNA knockdown (Vaughn *et al.*, 1995). Other groups have also demonstrated a decrease in the levels of HER2 protein, HER2 mRNA and/or cell proliferation in cultured
- 20 cells using anti-HER2 ribozymes or antisense molecules (Suzuki, T. *et al.*, 1997; Weichen, *et al.*, 1997; Czubyko, F. *et al.*, 1997; Colomer, *et al.*, 1994; Betram *et al.*, 1994). Because cell lines that express higher levels of HER2 have been more sensitive to anti-

HER2 agents, we are pursuing several medium to high expressing cell lines, including SKBR-3 and T47D, for ribozyme screens in cell culture.

- A variety of endpoints have been used in cell culture models to look at HER2-mediated effects after treatment with anti-HER2 agents. Phenotypic endpoints include
- 5 inhibition of cell proliferation, apoptosis assays and reduction of HER2 protein expression. Because overexpression of HER2 is directly associated with increased proliferation of breast and ovarian tumor cells, a proliferation endpoint for cell culture assays will be our primary screen. There are several methods by which this endpoint can be measured. Following treatment of cells with ribozymes, cells are allowed to grow (typically 5 days)
- 0 after which either the cell viability, the incorporation of [³H] thymidine into cellular DNA and/or the cell density can be measured. The assay of cell density is very straightforward and can be done in a 96-well format using commercially available fluorescent nucleic acid stains (such as Syto 13 or CyQuant). The assay using CyQuant is in place at RPI and is currently being employed to screen ~100 ribozymes targeting HER2 (details below).
- 5 As a secondary, confirmatory endpoint a ribozyme-mediated decrease in the level of HER2 protein expression can be evaluated using a HER2-specific ELISA.

Validation of Cell Lines and Ribozyme Treatment Conditions

- Two human breast cancer cell lines (T47D and SKBR-3) that are known to express
- 10 medium to high levels of HER2 protein, respectively, were considered for ribozyme screening. In order to validate these cell lines for HER2-mediated sensitivity, both cell lines were treated with the HER2 specific antibody, Herceptin® (Genentech) and its effect on cell proliferation was determined. Herceptin was added to cells at concentrations ranging from 0–8 µM in medium containing either no serum (OptiMem), 0.1% or 0.5%
- 5 FBS and efficacy was determined *via* cell proliferation. Maximal inhibition of proliferation (~50%) in both cell lines was observed after addition of Herceptin at 0.5 nM in medium containing 0.1% or no FBS. The fact that both cell lines are sensitive to an anti-HER2 agent (Herceptin) supports their use in experiments testing anti-HER2 ribozymes.
- 0 Prior to ribozyme screening, the choice of the optimal lipid(s) and conditions for ribozyme delivery was determined empirically for each cell line. Applicant has established a panel of proprietary lipids that can be used to deliver ribozymes to cultured cells and are

very useful for cell proliferation assays that are typically 3-5 days in length. Initially, this panel of proprietary lipid delivery vehicles was screened in SKBR-3 and T47D cells using previously established control oligonucleotides. Specific lipids and conditions for optimal delivery were selected for each cell line based on these screens. These conditions were used to deliver HER2 specific ribozymes to cells for primary (inhibition of cell proliferation) and secondary (decrease in HER2 protein) efficacy endpoints.

Primary Screen: Inhibition of Cell Proliferation

Although optimal ribozyme delivery conditions were determined for two cell lines, the SKBR-3 cell line were be used for the initial screen because it has the higher level of HER2 protein, and thus should be most susceptible to a HER2-specific ribozyme. Follow-up studies can be carried out in T47D cells to confirm leads as necessary.

Ribozyme screens were be performed using an automated, high throughput 96-well cell proliferation assay. Cell proliferation were measured over a 5-day treatment period using the nucleic acid stain CyQuant for determining cell density. The growth of cells treated with ribozyme/lipid complexes were compared to both untreated cells and to cells treated with Scrambled-arm Attenuated core Controls (SAC; or 1A; Figure 8). SACs can no longer bind to the target site due to the scrambled arm sequence and have nucleotide changes in the core that greatly diminish ribozyme cleavage. These SACs are used to determine non-specific inhibition of cell growth caused by ribozyme chemistry (*i.e.* multiple 2' O-Me modified nucleotides, a single 2'C-allyl uridine, 4 phosphorothioates and a 3' inverted abasic). Lead ribozymes are chosen from the primary screen based on their ability to inhibit cell proliferation in a specific manner. Dose response assays are carried out on these leads and a subset was advanced into a secondary screen using the level of HER2 protein as an endpoint.

Secondary Screen: Decrease in HER2 Protein

A secondary screen that measures the effect of anti-HER2 ribozymes on HER2 protein levels is used to support preliminary findings. A robust HER2 ELISA for both T47D and SKBR-3 cells has been established and is available for use as an additional endpoint.

Ribozyme Mechanism Assays

A Taqman assay for measuring the ribozyme-mediated decrease in HER2 RNA has also been established. This assay is based on PCR technology and can measure in real time the production of HER2 mRNA relative to a standard cellular mRNA such as GAPDH. This RNA assay is used to establish proof that lead ribozymes are working through an RNA cleavage mechanism and result in a decrease in the level of HER2 mRNA, thus leading to a decrease in cell surface HER2 protein receptors and a subsequent decrease in tumor cell proliferation.

Animal Models

Evaluating the efficacy of anti-HER2 agents in animal models is an important prerequisite to human clinical trials. As in cell culture models, the most HER2 sensitive mouse tumor xenografts are those derived from human breast carcinoma cells that express high levels of HER2 protein. In a recent study, nude mice bearing BT-474 xenografts were sensitive to the anti-HER2 humanized monoclonal antibody Herceptin, resulting in an 80% inhibition of tumor growth at a 1 mg/kg dose (ip, 2 X/week for 4-5 weeks). Tumor eradication was observed in 3 of 8 mice treated in this manner (Baselga *et al.*, 1998). This same study compared the efficacy of Herceptin alone or in combination with the commonly used chemotherapeutics, paclitaxel or doxorubicin. Although, all three anti-HER2 agents caused modest inhibition of tumor growth, the greatest antitumor activity was produced by the combination of Herceptin and paclitaxel (93% inhibition of tumor growth vs 35% with paclitaxel alone). The above studies provide proof that inhibition of HER2 expression by anti-HER2 agents causes inhibition of tumor growth in animals. Lead anti-HER2 ribozymes chosen from *in vitro* assays are further tested in mouse xenograft models. Ribozymes are first tested alone and then in combination with standard chemotherapies.

Animal Model Development

Three human breast tumor cell lines (T47D, SKBR-3 and BT-474) were characterized to establish their growth curves in mice. These three cell lines have been implanted into the mammary papillae of both nude and SCID mice and primary tumor volumes are measured 3 times per week. Growth characteristics of these tumor lines using

a Matrigel implantation format will also be established. In addition, the use of two other breast cell lines that have been engineered to express high levels of HER2 are also being used. The tumor cell line(s) and implantation method that supports the most consistent and reliable tumor growth is used in animal studies testing the lead HER2 ribozyme(s).

- 5 Ribozyme are administered by daily subcutaneous injection or by continuous subcutaneous infusion from Alzet mini osmotic pumps beginning 3 days after tumor implantation and continuing for the duration of the study. Group sizes of at least 10 animals are employed. Efficacy is determined by statistical comparison of tumor volume of ribozyme-treated animals to a control group of animals treated with saline alone. Because the growth of
- 0 these tumors is generally slow (45-60 days), an initial endpoint will be the time in days it takes to establish an easily measurable primary tumor (i.e. 50-100 mm³) in the presence or absence of ribozyme treatment.

Clinical Summary

- 5 Breast cancer is a common cancer in women and also occurs in men to a lesser degree. The incidence of breast cancer in the United States is ~180,000 cases per year and ~46,000 die each year of the disease. In addition, 21,000 new cases of ovarian cancer per year lead to ~13,000 deaths (data from Hung *et al.*, 1995 and the Surveillance, Epidemiology and End Results Program, NCI). Ovarian cancer is a potential secondary
- 0 indication for anti-HER2 ribozyme therapy.

A full review of breast cancer is given in the NCI PDQ for Breast Cancer. A brief overview is given here. Breast cancer is evaluated or "staged" on the basis of tumor size, and whether it has spread to lymph nodes and/or other parts of the body. In Stage I breast cancer, the cancer is no larger than 2 centimeters and has not spread outside of the breast.

- 5 In Stage II, the patient's tumor is 2-5 centimeters but cancer may have spread to the axillary lymph nodes. By Stage III, metastasis to the lymph nodes is typical, and tumors are 5 centimeters. Additional tissue involvement (skin, chest wall, ribs, muscles *etc.*) may also be noted. Once cancer has spread to additional organs of the body, it is classed as Stage IV.

- 0 Almost all breast cancers (>90%) are detected at Stage I or II, but 31% of these are already lymph node positive. The 5-year survival rate for node negative patients (with standard surgery/radiation/chemotherapy /hormone regimens) is 97%; however,

- involvement of the lymph nodes reduces the 5-year survival to only 77%. Involvement of other organs (Stage III) drastically reduces the overall survival, to 22% at 5 years. Thus, chance of recovery from breast cancer is highly dependent on early detection. Because up to 10% of breast cancers are hereditary, those with a family history are considered to be at high risk for breast cancer and should be monitored very closely.

- Breast cancer is highly treatable and often curable when detected in the early stages. (For a complete review of breast cancer treatments, see the NCI PDQ for Breast Cancer.) Common therapies include surgery, radiation therapy, chemotherapy and hormonal therapy. Depending upon many factors, including the tumor size, lymph node involvement and location of the lesion, surgical removal varies from lumpectomy (removal of the tumor and some surrounding tissue) to mastectomy (removal of the breast, lymph nodes and some or all of the underlying chest muscle). Even with successful surgical resection, as many as 21% of the patients may ultimately relapse (10-20 years). Thus, once local disease is controlled by surgery, adjuvant radiation treatments, chemotherapies and/or hormonal therapies are typically used to reduce the rate of recurrence and improve survival. The therapy regimen employed depends not only on the stage of the cancer at its time of removal, but other variables such the type of cancer (ductal or lobular), whether lymph nodes were involved and removed, age and general health of the patient and if other organs are involved.
- Common chemotherapies include various combinations cytotoxic drugs to kill the cancer cells. These drugs include paclitaxel (Taxol), docetaxel, cisplatin, methotrexate, cyclophosphamide, doxorubin, fluorouracil *etc.* Significant toxicities are associated with these cytotoxic therapies. Well-characterized toxicities include nausea and vomiting, myelosuppression, alopecia and mucosity. Serious cardiac problems are also associated with certain of the combinations, *e.g.* doxorubin and paclitaxel, but are less common.

- Testing for estrogen and progesterone receptors helps to determine whether certain anti-hormone therapies might be helpful in inhibiting tumor growth. If either or both receptors are present, therapies to interfere with the action of the hormone ligands, can be given in combination with chemotherapy and are generally continued for several years.
- These adjuvant therapies are called SERMs, selective estrogen receptor modulators, and they can give beneficial estrogen-like effects on bone and lipid metabolism while antagonizing estrogen in reproductive tissues. Tamoxifen is one such compound. The

- primary toxic effect associated with the use of tamoxifen is a 2 to 7-fold increase in the rate of endometrial cancer. Blood clots in the legs and lung and the possibility of stroke are additional side effects. However, tamoxifen has been determined to reduce breast cancer incidence by 49% in high-risk patients and an extensive, somewhat controversial, clinical study is underway to expand the prophylactic use of tamoxifen. Another SERM, raloxifene, was also shown to reduce the incidence of breast cancer in a large clinical trial where it was being used to treat osteoporosis. In additional studies, removal of the ovaries and/or drugs to keep the ovaries from working are being tested.

- Bone marrow transplantation is being studied in clinical trials for breast cancers that have become resistant to traditional chemotherapies or where >3 lymph nodes are involved. Marrow is removed from the patient prior to high-dose chemotherapy to protect it from being destroyed, and then replaced after the chemotherapy. Another type of "transplant" involves the exogenous treatment of peripheral blood stem cells with drugs to kill cancer cells prior to replacing the treated cells in the bloodstream.

- One biological treatment, a humanized monoclonal anti-HER2 antibody, Herceptin (Genentech) has been approved by the FDA as an additional treatment for HER2 positive tumors. Herceptin binds with high affinity to the extracellular domain of HER2 and thus blocks its signaling action. Herceptin can be used alone or in combination with chemotherapeutics (*i.e.* paclitaxel, docetaxel, cisplatin, *etc.*) (Pegram, *et al.*, 1998). In Phase III studies, Herceptin significantly improved the response rate to chemotherapy as well as improving the time to progression (Ross & Fletcher, 1998). The most common side effects attributed to Herceptin are fever and chills, pain, asthenia, nausea, vomiting, increased cough, diarrhea, headache, dyspnea, infection, rhinitis, and insomnia. Herceptin in combination with chemotherapy (paclitaxel) can lead to cardiotoxicity (Sparano, 1999), leukopenia, anemia, diarrhea, abdominal pain and infection.

HER2 Protein Levels for Patient Screening and as a Potential Endpoint

- Because elevated HER2 levels can be detected in at least 30% of breast cancers, breast cancer patients can be pre-screened for elevated HER2 prior to admission to initial clinical trials testing an anti-HER2 ribozyme. Initial HER2 levels can be determined (by ELISA) from tumor biopsies or resected tumor samples.

During clinical trials, it may be possible to monitor circulating HER2 protein by ELISA (Ross and Fletcher, 1998). Evaluation of serial blood/serum samples over the course of the anti-HER2 ribozyme treatment period could be useful in determining early indications of efficacy. In fact, the clinical course of Stage IV breast cancer was correlated with shed HER2 protein fragment following a dose-intensified paclitaxel monotherapy. In all responders, the HER2 serum level decreased below the detection limit (Luftner *et al.*).

Two cancer-associated antigens, CA27.29 and CA15.3, can also be measured in the serum. Both of these glycoproteins have been used as diagnostic markers for breast cancer. CA27.29 levels are higher than CA15.3 in breast cancer patients; the reverse is true in healthy individuals. Of these two markers, CA27.29 was found to better discriminate primary cancer from healthy subjects. In addition, a statistically significant and direct relationship was shown between CA27.29 and large vs small tumors and node positive vs node negative disease (Gion, *et al.*, 1999). Moreover, both cancer antigens were found to be suitable for the detection of possible metastases during follow-up (Rodriguez de Paterna *et al.*, 1999). Thus, blocking breast tumor growth may be reflected in lower CA27.29 and/or CA15.3 levels compared to a control group. FDA submissions for the use of CA27.29 and CA15.3 for monitoring metastatic breast cancer patients have been filed (reviewed in Beveridge, 1999). Fully automated methods for measurement of either of these markers are commercially available.

References

Baselga, J., Norton, L., Albanell, J., Kim, Y.M. and Mendelsohn, J. (1998) Recombinant humanized anti-HER2 antibody (Herceptin) enhances the antitumor activity of paclitaxel and doxorubicin against HER2/neu overexpressing human breast cancer xenografts. *Cancer Res.* 15: 2825-2831.

Berchuck, A., Kamel, A., Whitaker, R. *et al.* (1990) Overexpression of her-2/neu is associated with poor survival in advanced epithelial ovarian cancer. *Cancer Research* 50: 4087-4091.

Bertram, J. Killian, M., Brysch, W., Schlingensiepen, K.-H., and Kneba, M. (1994) Reduction of erbB2 gene product in mamma carcinoma cell lines by erbB2 mRNA-specific and tyrosine kinase consensus phosphorothioate antisense oligonucleotides. *Biochem. BioPhys. Res. Comm.* 200: 661-667.

- Beveridge, R.A. (1999) Review of clinical studies of CA27.29 in breast cancer management. *Int. J. Biol. Markers* 14: 36-39.
- Colomer, R., Lupu, R., Bacus, S.S. and Gelmann, E.P. (1994) *erbB-2* antisense oligonucleotides inhibit the proliferation of breast carcinoma cells with *erbB-2* oncogene amplification. *British J. Cancer* 70: 819-825.
- 5 Czubayko, F., Downing, S.G., Hsieh, S.S., Goldstein, D.J., Lu P.Y., Trapnell, B.C. and Wellstein, A. (1997) Adenovirus-mediated transduction of ribozymes abrogates HER-2/neu and pleiotrophin expression and inhibits tumor cell proliferation. *Gene Ther.* 4: 943-949.
- 0 Gion, M., Mione, R., Leon, A.E. and Dittadi, R. (1999) Comparison of the diagnostic accuracy of CA27.29 and CA15.3 in primary breast cancer. *Clin. Chem.* 45: 630-637.
- Hung, M.-C., Matin, A., Zhang, Y., Xing, X., Sorgi, F., Huang, L. and Yu, D. (1995) HER-2/neu-targeting gene therapy - a review. *Gene* 159: 65-71.
- 5 Luftner, D., Schnabel, S. and Possinger, K. (1999) c-erbB-2 in serum of patients receiving fractionated paclitaxel chemotherapy. *Int. J. Biol. Markers* 14: 55-59.
- McGuire, H.C. and Greene, M.I. (1989) The *neu* (c-erbB-2) oncogene. *Semin. Oncol.* 16: 148-155.
- NCI PDQ/Treatment/Health Professionals/Breast Cancer:
0 http://cancernet.nci.nih.gov/clinpdq/soa/Breast_cancer_Physician.html
- NCI PDQ/Treatment/Patients/Breast Cancer:
http://cancernet.nci.nih.gov/clinpdq/pif/Breast_cancer_Patient.html
- Pegram, M.D., Lipton, A., Hayes, D.F., Weber, B.L., Baselga, J.M., Tripathy, D., Baly, D., Baughman, S.A., Twaddell, T., Glaspy, J.A. and Slamon, D.J. (1998) Phase II
5 study of receptor-enhanced chemosensitivity using recombinant humanized anti-p185HER2/neu monoclonal antibody plus cisplatin in patients with HER2/neu-overexpressing metastatic breast cancer refractory to chemotherapy treatment. *J. Clin. Oncol.* 16: 2659-2671.
- Rodriguez de Paterna, L., Arnaiz, F., Estenoz, J., Ortuno, B. and Lanzos E. (1999)
0 Study of serum tumor markers CEA, CA15.3, CA27.29 as diagnostic parameters in patients with breast carcinoma. *Int. J. Biol. Markers* 10: 24-29.

Ross, J.S. and Fletcher, J.A. (1998) The HER-2/neu oncogene in breast cancer: Prognostic factor, predictive factor and target for therapy. *Oncologist* 3: 1998.

Slamon, D.J., Clark, G.M., Wong, S.G., Levin, W.J., Ullrich, A. and McGuire, W.L. (1987) Human breast cancer: correlation of relapse and survival with amplification of the

5 HER-2/neu oncogene. *Science* 235: 177-182.

Sparano, J.A. (1999) Doxorubicin/taxane combinations: Cardiac toxicity and pharmacokinetics. *Semin. Oncol.* 26: 14-19.

Surveillance, Epidemiology and End Results Program (SEER) Cancer Statistics Review: http://www.seer.ims.nci.nih.gov/Publications/CSRI973_1996/

0 Suzuki T., Curcio, L.D., Tsai, J. and Kashani-Sabet M. (1997) Anti-c-erb-B-2 Ribozyme for Breast Cancer. In *Methods in Molecular Medicine*, Vol. 11, Therapeutic Applications of Ribozymes, Human Press, Inc., Totowa, NJ.

aughn, J.P., Iglehart, J.D., Demirdji, S., Davis, P., Babiss, L.E., Caruthers, M.H., Marks, J.R. (1995) Antisense DNA downregulation of the ERBB2 oncogene measured by

5 a flow cytometric assay. *Proc Natl Acad Sci USA* 92: 8338-8342.

Weichen, K., Zimmer, C. and Dietel, M. (1997) Selection of a high activity c-erbB-2 ribozyme using a fusion gene of c-erbB-2 and the enhanced green fluorescent protein. *Cancer Gene Therapy* 5: 45-51.

Wright, M., Grim, J., Deshane, J., Kim, M., Strong, T.V., Siegel, G.P., Curiel, D.T. 0 (1997) An intracellular anti-erbB-2 single-chain antibody is specifically cytotoxic to human breast carcinoma cells overexpressing erbB-2. *Gene Therapy* 4: 317-322.

Applicant has designed, synthesized and tested several NCH ribozymes and HH ribozymes targeted against HER2 RNA (see for example **Tables 31 and 34**) in cell proliferation assays.

5

Proliferation assay:

The model proliferation assay used in the study can require a cell plating density of 2000 cells/well in 96-well plates and at least 2 cell doublings over a 5-day treatment period. To calculate cell density for proliferation assays, the FIPS (fluoro-imaging 0 processing system) method well in the art was used. This method allows for cell density measurements after nucleic acids are stained with CyQuant dye, and has the advantage of

accurately measuring cell densities over a very wide range 1,000-100,000 cells/well in 96-well format.

Ribozymes (50-200 nM) were delivered in the presence of cationic lipid at 2.0 µg/mL and inhibition of proliferation was determined on day 5 post-treatment. Two full ribozyme screens were completed and 4 lead HH and 11 lead NCH ribozymes were chosen for further testing. Of the 15 lead Rzs chosen from primary screens, 4 NCH and 1 HH Rzs continued to inhibit cell proliferation in subsequent experiments. NCH Rzs against sites, 2001 (RPI No. 17236), 2783 (RPI No. 17249), 2939 (RPI No. 17251) or 3998 (RPI No. 17262) caused inhibition of proliferation ranging from 25-60% as compared to a scrambled control Rz (IA; RPI No. 17263). Of the five lead Rzs, the most efficacious is the NCH Rz (RPI No. 17251) against site 2939 of HER2 RNA. An example of results from cell culture assay is shown in **Figure 8**. Referring to **Figure 8**, NCH ribozymes and a HH ribozyme targeted against HER2 RNA, are shown to cause significant inhibition of proliferation of cells. This shows that ribozymes, for instance the NCH ribozymes are capable of inhibiting HER2 gene expression in mammalian cells.

Example 8: Activity of Class II (Zinzyme) nucleic acid catalysts to inhibit HER2 gene expression

Applicant has designed, synthesized and tested several class II (zinzyme) ribozymes targeted against HER2 RNA (see, for example, **Tables 58, 59, and 62**) in cell proliferation RNA reduction assays.

Proliferation assay:

The model proliferation assay used in the study requires a cell-plating density of 2000-10000 cells/well in 96-well plates and at least 2 cell doublings over a 5-day treatment period. Cells used in proliferation studies were either human breast or ovarian cancer cells (SKBR-3 and SKOV-3 cells respectively). To calculate cell density for proliferation assays, the FIPS (fluoro-imaging processing system) method well known in the art was used. This method allows for cell density measurements after nucleic acids are stained with CyQuant® dye, and has the advantage of accurately measuring cell densities over a very wide range 1,000-100,000 cells/well in 96-well format.

Ribozymes (50-200 nM) were delivered in the presence of cationic lipid at 2.0-5.0 µg/mL and inhibition of proliferation was determined on day 5 post-treatment. Two full ribozyme screens were completed resulting in the selection of 14 ribozymes. Class II (zinzyme) ribozymes against sites, 314 (RPI No. 18653), 443 (RPI No. 18680), 597 (RPI No. 18697), 659 (RPI No. 18682), 878 (RPI Nos. 18683 and 18654), 881 (RPI Nos. 18684 and 18685) 934 (RPI No. 18651), 972 (RPI No. 18656, 19292, 19727, 19728, and 19293), 1292 (RPI No. 18726), 1541 (RPI No. 18687), 2116 (RPI No. 18729), 2932 (RPI No. 18678), 2540 (RPI No. 18715), and 3504 (RPI No. 18710) caused inhibition of proliferation ranging from 25-80% as compared to a scrambled control ribozyme. An example of results from a cell culture assay is shown in **Figure 20**. Referring to **Figure 20**, Class II ribozymes targeted against HER2 RNA are shown to cause significant inhibition of proliferation of cells. This shows that ribozymes, for instance the Class II (zinzyme) ribozymes are capable of inhibiting HER2 gene expression in mammalian cells.

5 RNA assay:

RNA was harvested 24 hours post-treatment using the Qiagen RNeasy® 96 procedure. Real time RT-PCR (TaqMan® assay) was performed on purified RNA samples using separate primer/probe sets specific for either target HER2 RNA or control actin RNA (to normalize for differences due to cell plating or sample recovery). Results are shown as the average of triplicate determinations of HER2 to actin RNA levels post-treatment. **Figure 30** shows class II ribozyme (zinzyme) mediated reduction in HER2 RNA targeting site 972 vs a scrambled attenuated control.

Dose response assays:

5 Active ribozyme was mixed with binding arm-attenuated control (BAC) ribozyme to a final oligonucleotide concentration of either 100, 200 or 400 nM and delivered to cells in the presence of cationic lipid at 5.0 µg/mL. Mixing active and BAC in this manner maintains the lipid to ribozyme charge ratio throughout the dose response curve. HER2 RNA reduction was measured 24 hours post-treatment and inhibition of proliferation was determined on day 5 post-treatment. The dose response antiproliferation results are summarized in **Figure 31** and the dose-dependent reduction of HER2 RNA results are

summarized in Figure 32. Figure 33 shows a combined dose response plot of both anti-proliferation and RNA reduction data for a class II ribozyme targeting site 972 of HER2 RNA (RPI 19293).

5 Example 9: Compositions having RNA cleaving activity

- Hammerhead ribozymes are an example of catalytic RNA molecules which are able to recognize and cleave a given specific RNA substrate (Hutchins *et al.*, 1986, *Nucleic Acids Res.* 14:3627; Keese and Symons, in *Viroids and viroid-like pathogens* (J.J. Semanchik, publ., CRC-Press, Boca Raton, Florida, 1987, pages 1-47). The catalytic center of hammerhead ribozymes is flanked by three stems and can be formed by adjacent sequence regions of the RNA or also by regions, which are separated from one another by many nucleotides. Figure 6 shows a diagram of such a catalytically active hammerhead structure. The stems have been denoted I, II and III. The nucleotides are numbered according to the standard nomenclature for hammerhead ribozymes (Hertel *et al.*, 1992, *Nucleic Acids Res.* 20:3252). In this nomenclature, bases are denoted by a number, which relates their position relative to the 5' side of the cleavage site. Furthermore, each base that is involved in a stem or loop region has an additional designation (which is denoted by a decimal point and then another number) that defines the position of that base within the stem or loop. A designation of A^{15.1} would indicate that this base is involved in a paired region and that it is the first nucleotide in that stem going away from the core region. This accepted convention for describing hammerhead-derived ribozymes allows for the nucleotides involved in the core of the enzyme to always have the same number relative to all of the other nucleotides. The size of the stems involved in substrate binding or core formation can be any size and of any sequence, and the position of A⁹, for example, will remain the same relative to all of the other core nucleotides. Nucleotides designated, for example, N¹²^ or N⁹^ represent an inserted nucleotide where the position of the caret (^) relative to the number denotes whether the insertion is before or after the indicated nucleotide. Thus, N¹²^ represents a nucleotide inserted before nucleotide position 12, and N⁹^ represents a nucleotide inserted after nucleotide position 9.
- The consensus sequence of the catalytic core structure is described by Ruffner and Uhlenbeck, 1990, *Nucleic Acids Res.* 18:6025-6029. Perriman *et al.*, 1992, *Gene* 113:157-163, have meanwhile shown that this structure can also contain variations, for example,

- naturally occurring nucleotide insertions such as $N^{9\wedge}$ and $N^{\wedge 12}$. Thus, the positive strand of the satellite RNA of the tobacco ring-spot virus does not contain any of the two nucleotide insertions while the +RNA strand of the virusoid of the lucerne transient streak virus (vLTSV) contains a $N^{9\wedge} = U$ insertion which can be mutated to C or G without loss of activity (Sheldon and Symons, 1989, *Nucleic Acids Res.* 17:5679-5685). Furthermore, in this special case, $N^7 = A$ and $R^{15,1} = A$. On the other hand, the minus strand of the carnation stunt associated viroid (-CarSV) is quite unusual since it contains both nucleotide insertions, that is $N^{\wedge 12} = A$ and $N^{9\wedge} = C$ (Hernandez *et al.*, 1992, *Nucleic Acids Res.* 20:6323-6329). In this viroid $N^7 = A$ and $R^{15,1} = A$. In addition, this special hammerhead structure exhibits a very effective self-catalytic cleavage despite the more open central stem.

- Possible uses of hammerhead ribozymes include, for example, generation of RNA restriction enzymes and the specific inactivation of the expression of genes in, for example, animal, human or plant cells and prokaryotes, yeasts and plasmodia. A particular biomedical interest is based on the fact that many diseases, including many forms of tumors, are related to the overexpression of specific genes. Inactivating such genes by cleaving the associated mRNA represents a possible way to control and eventually treat such diseases. Moreover there is a great need to develop antiviral, antibacterial, and antifungal pharmaceutical agents. Ribozymes have potential as such anti-infective agents since RNA molecules vital to the survival of the organism can be selectively destroyed.

- In addition to needing the correct hybridizing sequences for substrate binding, substrates for hammerhead ribozymes have been shown to strongly prefer the triplet $N^{16,2}U^{16,1}H^{17}$ (NUH) where N can be any nucleotide, U is uridine, and H is either adenosine, cytidine, or uridine (Koizumi *et al.*, 1988, *FEBS Lett.* 228, 228-230; Ruffner *et al.*, 1990, *Biochemistry* 29, 10695-10702; Perriman *et al.*, 1992, *Gene* 113, 157-163). NUH is sometimes designated as NUX. The fact that changes to this general rule for substrate specificity result in non-functional substrates implies that there are "non core compatible" structures which are formed when substrates are provided which deviate from the stated requirements. Evidence along these lines was recently reported by Uhlenbeck and co-workers (Uhlenbeck *et al.*, 1997, *Biochemistry* 36:1108-1114) when they demonstrated that the substitution of a G at position 17 caused a functionally catastrophic base pair between G^{17} and C^3 to form, both preventing the correct orientation of the

scissile bond for cleavage and the needed tertiary interactions of C³ (Murray *et al.*, 1995, *Biochem. J.* 311:487-494). The strong preference for a U at position 16.1 may exist for similar reasons. Many experiments have been done in an attempt to isolate ribozymes which are able to efficiently relieve the requirement of a U at position 16.1, however, attempts to find hammerhead type ribozymes which can cleave substrates having a base other than a U at position 16.1 have proven impossible (Perriman *et al.*, 1992, *Gene* 113, 157-163).

Efficient catalytic molecules with reduced or altered requirements in the cleavage region are highly desirable because their isolation would greatly increase the number of available target sequences that molecules of this type could cleave. For example, it would be desirable to have a ribozyme variant that could efficiently cleave substrates containing triplets other than N^{16.2}U^{16.1}H¹⁷ since this would increase the number of potential target cleavage sites.

Chemically modified oligonucleotides which contain a block of deoxyribonucleotides in the middle region of the molecule have potential as pharmaceutical agents for the specific inactivation of the expression of genes (Giles *et al.*, 1992, *Nucleic Acids Res.* 20:763-770). These oligonucleotides can form a hybrid DNA-RNA duplex in which the DNA bound RNA strand is degraded by RNase H. Such oligonucleotides are considered to promote cleavage of the RNA and so cannot be characterized as having an RNA-cleaving activity nor as cleaving an RNA molecule (the RNase H is cleaving). A significant disadvantage of these oligonucleotides for *in vivo* applications is their low specificity, since hybrid formation, and thus cleavage, can also take place at undesired positions on the RNA molecules.

Since, unmodified ribozymes are sensitive to degradation by RNases, chemically modified active substances have to be used in order to administer hammerhead ribozymes exogenously (discussed, for example, by Heidenreich *et al.*, 1994, *J. Biol. Chem.* 269:2131-2138; Kiehntopf *et al.*, 1994, *EMBO J.* 13:4645-4652; Paoletta *et al.*, 1992, *EMBO J.* 11:1913-1919; and Usman *et al.*, 1994, *Nucleic Acids Symp. Ser.* 31:163-164).

Sproat *et al.*, U.S. Pat. No. 5,334,711, describe such chemically modified active substances based on synthetic catalytic oligonucleotide structures with a length of 35 to 40 nucleotides which are suitable for cleaving a nucleic acid target sequence and contain modified nucleotides that contain an optionally substituted alkyl, alkenyl or alkynyl group

with 1 - 10 carbon atoms at the 2'-O atom of the ribose. These oligonucleotides contain modified nucleotide building blocks and form a structure resembling a hammerhead structure. These oligonucleotides are able to cleave specific RNA substrates.

- 5 Usman *et al.*, U.S. Patent No. 5,891,684, describe enzymatic nucleic acid molecules with one or more nucleotide base modification(s) in a substrate binding arm.

Thompson *et al.*, US Patent No. 5,599,704 describe enzymatic RNA molecules targeted against ErbB2/*neu*/Her2 RNA.

Sullivan *et al.*, US Patent No. 5,616,490 describe enzymatic RNA molecules targeted against protein kinase C (PKC) RNA.

- 0 Sioud, International PCT publication No. WO 99/63066 describe hammerhead ribozymes targeted against specific sites within protein kinase C alpha (PKC alpha), VEGF, and TNF alpha RNA.

Jarvis *et al.*, International PCT publication No. WO 98/505030, describe the synthesis of xylo-ribonucleosides and oligonucleotides comprising xylo modifications.

- 5 This invention relates to novel enzymatic nucleic acid molecules having an RNA-cleavage activity, as well as their use for cleaving RNA substrates *in vitro* and *in vivo*. The compositions contain an active center, the subunits of which are selected from nucleotides and/or nucleotide analogues, as well as flanking regions contributing to the formation of a specific hybridization with an RNA substrate. Preferred compositions form, in

- 0 combination with an RNA substrate, a structure resembling a hammerhead structure. The active center of the disclosed compositions is characterized by the presence of I^{15.1} which allows cleavage of RNA substrates having C^{16.1}. It is therefore an object of the present invention to provide compositions that cleave RNA, and in particular to provide RNA-cleaving oligomers which at the same time have a high stability, activity, and specificity.

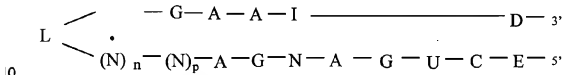
- 5 This invention relates to novel nucleic acid molecules with catalytic activity, which are particularly useful for cleavage of RNA or DNA or combination thereof. The nucleic acid catalysts of the instant invention are distinct from other nucleic acid catalysts known in the art. Specifically, nucleic acid catalysts of the instant invention are capable of catalyzing an intermolecular or intramolecular endonuclease reaction.

- 0 It is another object of the present invention to provide compositions that cleave RNA substrates having a cleavage site triplet other than N^{16.2}U^{16.1}H¹⁷ (NUH; **Figure 6**), where N is a nucleotide, U is uridine and H is adenosine, uridine or cytidine. H is used

interchangeably with X. Specifically, the enzymatic nucleic acid molecule of the instant invention has an endonuclease activity to cleave RNA substrates having a cleavage triplet $N^{16,2}C^{16,1}H^{17}$ (NCH; **Figure 6**), where N is a nucleotide, C is cytidine and H is adenosine, uridine or cytidine. H is used interchangeably with X. In another aspect the invention

- 5 features an enzymatic nucleic acid molecule of the instant invention has an endonuclease activity to cleave RNA substrates having a cleavage triplet $N^{16,2}C^{16,1}N^{17}$ (NCN; **Figure 6**), where N is a nucleotide, C is cytidine.

In a preferred embodiment, the invention features an enzymatic nucleic acid molecule having formula 1:

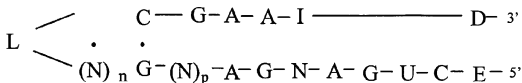


- where N represents independently a nucleotide or a non-nucleotide linker, which may be same or different; D and E are independently oligonucleotides of length sufficient to stably interact (e.g., by forming hydrogen bonds with complementary nucleotides in the target) with a target nucleic acid molecule (the target can be an RNA, DNA or mixed polymers), preferably, the length of D and E are independently between 3-20 nucleotides long, specifically, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, and 20; o and n are integers independently greater than or equal to 1 and preferably less than about 100, specifically 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 50, wherein if $(N)_o$ and $(N)_n$ are nucleotides, $(N)_o$ and $(N)_n$ are optionally able to interact by hydrogen bond interaction, in particular if $n=1$ and $o=1$ then $(N)_n$ is preferably a purine (e.g., G, and A) and $(N)_o$ is preferably a pyrimidine (e.g., C and U) and $(N)_n$ preferably forms; • indicates base-paired interaction; L is a linker which may be present or absent (i.e., the molecule may be assembled from two separate oligonucleotides), but when present, is a nucleotide and/or a non-nucleotide linker, which may be a single-stranded and/or double-stranded region; p is an integer 0 or 1, when $p=1$, $(N)_p$ is preferably A or U; and _____ represents a chemical linkage (e.g. a phosphate ester linkage, amide linkage, phosphorothioate linkage or others known in the art). A, U, I, C and G represent adenosine, uridine, inosine, cytidine and guanosine nucleotides, respectively. The N in 5'-CUGANGA-3' region of formula 1 is preferably U.

The nucleotides in the formula 1 are unmodified or modified at the sugar, base, and/or phosphate as known in the art.

In a preferred embodiment, the invention features an enzymatic nucleic acid molecule having formula 2:

5



0

where N represents independently a nucleotide or a non-nucleotide linker, which may be same or different; D and E are independently oligonucleotides of length sufficient to stably interact (*e.g.*, by forming hydrogen bonds with complementary nucleotides in the target) with a target nucleic acid molecule (the target can be an RNA, DNA or mixed polymers), preferably, the length of D and E are independently between 3-20 nucleotides long, specifically, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, and 20; o and n are integers independently greater than or equal to 0 and preferably less than about 100, specifically 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 50, wherein if (N)_o and (N)_n are nucleotides, (N)_o

5

and (N)_n are optionally able to interact by hydrogen bond interaction; • indicates base-paired interaction; L is a linker which may be present or absent (*i.e.*, the molecule may be assembled from two separate oligonucleotides), but when present, is a nucleotide and/or a non-nucleotide linker, which may be a single-stranded and/or double-stranded region; p is an integer 0 or 1, when p=1, (N)_p is preferably A, C or U; and _____ represents a

0

chemical linkage (*e.g.* a phosphate ester linkage, amide linkage, phosphorothioate linkage or others known in the art). A, U, I, C and G represent adenosine, uridine, inosine, cytidine and guanosine nucleotides, respectively. The N in 5'-CUGANGA-3' region of formula 2 is preferably U. The nucleotides in the formula 2 are unmodified or modified at the sugar, base, and/or phosphate as known in the art.

5

In a preferred embodiment, the I (inosine) in formula 1 and 2 is preferably a ribo-inosine or a xylo-inosine.

- In yet another embodiment, the nucleotide linker (L) is a nucleic acid aptamer, such as an ATP aptamer, HIV Rev aptamer (RRE), HIV Tat aptamer (TAR) and others (for a review see Gold *et al.*, 1995, *Annu. Rev. Biochem.*, 64, 763; and Szostak & Ellington, 1993, in *The RNA World*, ed. Gesteland and Atkins, pp 511, CSH Laboratory Press). A
- 5 "nucleic acid aptamer" as used herein is meant to indicate nucleic acid sequence capable of interacting with a ligand. The ligand can be any natural or a synthetic molecule, including but not limited to a resin, metabolites, nucleosides, nucleotides, drugs, toxins, transition state analogs, peptides, lipids, proteins, amino acids, nucleic acid molecules, hormones, carbohydrates, receptors, cells, viruses, bacteria and others. In a preferred embodiment L
- 0 has the sequence 5'-GAAA-3' or 5'-GUUA-3'.

In yet another embodiment, the non-nucleotide linker (L) is as defined herein.

- The term "non-nucleotide", as used herein, includes either abasic nucleotide, polyether, polyamine, polyamide, peptide, carbohydrate, lipid, or polyhydrocarbon compounds. Specific examples include those described by Seela and Kaiser, *Nucleic*
- 5 *Acids Res.* 1990, 18:6353 and *Nucleic Acids Res.* 1987, 15:3113; Cload and Schepartz, *J. Am. Chem. Soc.* 1991, 113:6324; Richardson and Schepartz, *J. Am. Chem. Soc.* 1991, 113:5109; Ma *et al.*, *Nucleic Acids Res.* 1993, 21:2585 and *Biochemistry* 1993, 32:1751; Durand *et al.*, *Nucleic Acids Res.* 1990, 18:6353; McCurdy *et al.*, *Nucleosides & Nucleotides* 1991, 10:287; Ischke *et al.*, *Tetrahedron Lett.* 1993, 34:301; Ono *et al.*,
- 0 *Biochemistry* 1991, 30:9914; Arnold *et al.*, International Publication No. WO 89/02439; Usman *et al.*, International Publication No. WO 95/06731; Dudycz *et al.*, International Publication No. WO 95/11910 and Ferentz and Verdine, *J. Am. Chem. Soc.* 1991, 113:4000, all hereby incorporated by reference herein. Non-nucleotide linkers can be any molecule, which is not an oligomeric sequence, that can be covalently coupled to an
- 5 oligomeric sequence. Preferred non-nucleotide linkers are oligomeric molecules formed of non-nucleotide subunits. Examples of such non-nucleotide linkers are described by Letsinger and Wu, (*J. Am. Chem. Soc.* 117:7323-7328 (1995)), Benseler *et al.*, (*J. Am. Chem. Soc.* 115:8483-8484 (1993)) and Fu *et al.*, (*J. Am. Chem. Soc.* 116:4591-4598 (1994)). Preferred non-nucleotide linkers, or subunits for non-nucleotide linkers, include
- 0 substituted or unsubstituted C₁-C₁₀ straight chain or branched alkyl, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkenyl, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkynyl, substituted or unsubstituted C₁-C₁₀ straight chain or

- branched alkoxy, substituted or unsubstituted C₂-C₁₀ straight chain or branched alkenyloxy, and substituted or unsubstituted C₂-C₁₀ straight chain or branched alkynyloxy. The substituents for these preferred non-nucleotide linkers (or subunits) can be halogen, cyano, amino, carboxy, ester, ether, carboxamide, hydroxy, or mercapto. Thus, in a preferred embodiment, the invention features an enzymatic nucleic acid molecule having one or more non-nucleotide moieties, and having enzymatic activity to cleave an RNA or DNA molecule. By the term "non-nucleotide" is meant any group or compound which can be incorporated into a nucleic acid chain in the place of one or more nucleotide units, including either sugar and/or phosphate substitutions, and allows the remaining bases to exhibit their enzymatic activity. The group or compound is abasic in that it does not contain a commonly recognized nucleotide base, such as adenosine, guanine, cytosine, uracil or thymine. The terms "abasic" or "abasic nucleotide" as used herein encompass sugar moieties lacking a base or having other chemical groups in place of nucleotide base at the 1' position.
- In a preferred embodiment, the invention features modified ribozymes with phosphate backbone modifications comprising one or more phosphorothioate, phosphorodithioate, methylphosphonate, morpholino, amidate carbamate, carboxymethyl, acetamidate, polyamide, sulfonamide, sulfamate, formacetal, thioformacetal, and/or alkylsilyl, substitutions. For a review of oligonucleotide backbone modifications see Hunziker and Leumann, 1995, *Nucleic Acid Analogues: Synthesis and Properties*, in *Modern Synthetic Methods*, VCH, 331-417, and Mesmaeker et al., 1994, *Novel Backbone Replacements for Oligonucleotides*, in *Carbohydrate Modifications in Antisense Research*, ACS, 24-39.

- In a further preferred embodiment of the instant invention, an inverted deoxy abasic moiety is utilized at the 3' end of the enzymatic nucleic acid molecule.

By "pyrimidines" is meant nucleotides comprising modified or unmodified derivatives of a six membered pyrimidine ring. An example of a pyrimidine is modified or unmodified uridine.

- In a preferred embodiment, the nucleosides of the instant invention include, 2'-O-methyl-2,6-diaminopurine riboside; 2'-deoxy-2'-amino-2,6-diaminopurine riboside; 2'-(N-alanyl) amino-2'-deoxy-uridine; 2'-(N-phenylalanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-(N-beta-alanyl) amino ; 2'-deoxy-2'-(lysyl) amino uridine; 2'-C-allyl uridine; 2'-O-amino-

- uridine; 2'-O-methylthiomethyl adenosine; 2'-O-methylthiomethyl cytidine ; 2'-O-methylthiomethyl guanosine; 2'-O-methylthiomethyl-uridine; 2'-Deoxy-2'-(N-histidyl) amino uridine; 2'-deoxy-2'-amino-5-methyl cytidine; 2'-(N- β -carboxamidine-beta-alanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-(N-beta-alanyl)-guanosine; 2'-O-amino-adenosine; 2'-(N-lysyl)amino -2'-deoxy-cytidine; 2'-Deoxy -2'-(L-histidine) amino Cytidine; and 5-Imidazoleacetic acid 2'-deoxy-5'-triphosphate uridine.

- By "oligonucleotide" as used herein is meant a molecule having two or more nucleotides. The polynucleotide can be single, double or multiple stranded and may have modified or unmodified nucleotides or non-nucleotides or various mixtures and combinations thereof.

- In a preferred embodiment, the enzymatic nucleic acid molecule of formula 1 or 2 include at least three ribonucleotide residues, preferably 4, 5, 6, 7, 8, 9, and 10 ribonucleotide residues.

- In preferred embodiments, the enzymatic nucleic acid of the instant invention includes one or more stretches of RNA, which provide the enzymatic activity of the molecule, linked to the non-nucleotide moiety. The necessary RNA components are known in the art (see for *e.g.*, Usman *et al.*, *supra*).

- Thus, in one preferred embodiment, the invention features enzymatic nucleic acid molecules that inhibit gene expression and/or cell proliferation *in vitro* or *in vivo* (*e.g.* in patients). These chemically or enzymatically synthesized nucleic acid molecules contain substrate binding domains that bind to accessible regions of specific target nucleic acid molecules. The nucleic acid molecules also contain domains that catalyze the cleavage of target. Upon binding, the enzymatic nucleic acid molecules cleave the target molecules, preventing for example, translation and protein accumulation. In the absence of the expression of the target gene, cell proliferation, for example, is inhibited.

- In another preferred embodiment, catalytic activity of the molecules described in the instant invention can be optimized as described by Draper *et al.*, *supra*. The details will not be repeated here, but include altering the length of the ribozyme binding arms, or chemically synthesizing ribozymes with modifications (base, sugar and/or phosphate) that prevent their degradation by serum ribonucleases and/or enhance their enzymatic activity (see *e.g.*, Eckstein *et al.*, International Publication No. WO 92/07065; Perrault *et al.*, 1990 *Nature* 344, 565; Pieken *et al.*, 1991 *Science* 253, 314; Usman and Cedergren, 1992

Trends in Biochem. Sci. 17, 334; Usman *et al.*, International Publication No.

WO 93/15187; and Rossi *et al.*, International Publication No. WO 91/03162; Sproat, US Patent No. 5,334,711; and Burgin *et al.*, *supra*; all of these describe various chemical modifications that can be made to the base, phosphate and/or sugar moieties of enzymatic

- 5 RNA molecules). Modifications which enhance their efficacy in cells, and removal of bases from stem loop structures to shorten RNA synthesis times and reduce chemical requirements are desired. (All these publications are hereby incorporated by reference herein.).

- By "nucleic acid catalyst" as used herein is meant a nucleic acid molecule (*e.g.*, the
- 10 molecule of formulae 1 and 2) capable of catalyzing (altering the velocity and/or rate of) a variety of reactions including the ability to repeatedly cleave other separate nucleic acid molecules (endonuclease activity) in a nucleotide base sequence-specific manner. Such a molecule with endonuclease activity may have complementarity in a substrate binding region to a specified gene target, and also has an enzymatic activity that specifically
- 15 cleaves RNA or DNA in that target. That is, the nucleic acid molecule with endonuclease activity is able to intramolecularly or intermolecularly cleave RNA or DNA and thereby inactivate a target RNA or DNA molecule. This complementarity functions to allow sufficient hybridization of the enzymatic RNA molecule to the target RNA or DNA to allow the cleavage to occur. 100% complementarity is preferred, but complementarity as
- 20 low as 50-75% may also be useful in this invention. The nucleic acids may be modified at the base, sugar, and/or phosphate groups. The term enzymatic nucleic acid as used herein is used interchangeably with phrases such as ribozymes, catalytic RNA, enzymatic RNA, catalytic oligonucleotides, nucleozyme, RNA enzyme, endoribonuclease, endonuclease, minizyme, oligozyme, finder on or nucleic acid catalyst. All of these terminologies
- 25 describe nucleic acid molecules of the instant invention with enzymatic activity. The specific examples of enzymatic nucleic acid molecules described in the instant application are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific substrate binding site which is complementary to one or more of the target nucleic acid
- 30 regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart a nucleic acid cleaving activity to the molecule (Cech *et al.*, U.S. Patent No. 4,987,071; Cech *et al.*, 1988, 260 *JAMA* 3030).

The enzymatic nucleic acid molecule of Formula 1 or 2 may independently comprise a cap structure which may independently be present or absent.

By "chimeric nucleic acid molecule" or "mixed polymer" is meant that, the molecule may be comprised of both modified or unmodified nucleotides.

- 5 In yet another preferred embodiment, the 3'-cap is selected from a group comprising, 4',5'-methylene nucleotide; 1-(beta-D-erythrofuranosyl) nucleotide; 4'-thio nucleotide, carbocyclic nucleotide; 5'-amino-alkyl phosphate; 1,3-diamino-2-propyl phosphate, 3-aminopropyl phosphate; 6-aminohexyl phosphate; 1,2-aminododecyl phosphate; hydroxypropyl phosphate; 1,5-anhydrohexitol nucleotide; L-nucleotide; alpha-nucleotide;
- 10 modified base nucleotide; phosphorodithioate; *threo*-pentofuranosyl nucleotide; acyclic 3',4'-seco nucleotide; 3,4-dihydroxybutyl nucleotide; 3,5-dihydroxypentyl nucleotide, 5'-5'-inverted nucleotide moiety; 5'-5'-inverted abasic moiety; 5'-phosphoramidate; 5'-phosphorothioate; 1,4-butanediol phosphate; 5'-amino; bridging and/or non-bridging 5'-phosphoramidate, phosphorothioate and/or phosphorodithioate, bridging or non bridging
- 15 methylphosphonate and 5'-mercapto moieties (for more details, see Beaucage and Iyer, 1993, *Tetrahedron* 49, 1925; incorporated by reference herein). By the term "non-nucleotide" is meant any group or compound which can be incorporated into a nucleic acid chain in the place of one or more nucleotide units, including either sugar and/or phosphate substitutions, and allows the remaining bases to exhibit their enzymatic activity. The
- 20 group or compound is abasic in that it does not contain a commonly recognized nucleotide base, such as adenosine, guanine, cytosine, uracil or thymine. The terms "abasic" or "abasic nucleotide" as used herein encompass sugar moieties lacking a base or having other chemical groups in place of a base at the 1' position.

- 25 In a preferred embodiment, the invention features 1-(beta-D-xylofuranosyl)-xypoxanthine phosphoramidite and a process for the synthesis thereof and incorporation into oligonucleotides, such as enzymatic nucleic acid molecule.

In yet another preferred embodiment, the invention features enzymatic nucleic acid molecules targeted against HER2 RNA, specifically, ribozymes in the hammerhead and NCH motifs.

- 30 In a preferred embodiment, the invention features enzymatic nucleic acid molecules targeted against PKC alpha RNA, specifically, ribozymes in the hammerhead and NCH motifs.

Targets, for example PKC alpha RNA, for useful ribozymes and antisense nucleic acids can be determined, for example, as described in Draper *et al.*, WO 95/04818; McSwiggen *et al.*, U.S. Patent Nos. 5,525,468 and 5,646,042, all are hereby incorporated by reference herein in their totality. Other examples include the following PCT

- 5 applications, which concern inactivation of expression of disease-related genes: WO 95/23225, WO 95/13380, WO 94/02595, all incorporated by reference herein.

The specific enzymatic nucleic acid molecules described in the instant application are not limiting in the invention and those skilled in the art will recognize that all that is important in an enzymatic nucleic acid molecule of this invention is that it has a specific
0 substrate binding site (*e.g.*, D and E of Formula 1 above) which is complementary to one or more of the target nucleic acid regions, and that it have nucleotide sequences within or surrounding that substrate binding site which impart a nucleic acid cleaving activity to the molecule.

- All naturally occurring hammerhead ribozymes have an A^{15.1}-U^{16.1} base pair. In addition, it is known that substrates for ribozymes based on the consensus hammerhead sequence strongly prefer a substrate that contains an N^{16.2}-U^{16.1}-H¹⁷ triplet in which H¹⁷ is not a guanosine (Koizumi *et al.*, *FEBS Lett.* 228, 228-230 (1988); Ruffner *et al.*, *Biochemistry* 29, 10695-10702 (1990); Perriman *et al.*, *Gene* 113, 157-163 (1992)). Many experiments have been done in an attempt to isolate ribozymes which are able to
0 efficiently relieve the requirement of a U at position 16.1, however, attempts to find ribozymes which can cleave substrates having a base other than a U at position 16.1 have proven largely unsuccessful (Perriman *et al.*, *Gene* 113, 157-163 1992, Singh *et al.*, *Antisense and Nucleic Acid Drug Development* 6:165-168 (1996)).

- However, examination of the recently published X-ray crystal structures (Pley *et al.*,
5 *Nature* 372:68-74 (1994), Scott *et al.*, *Cell* 81:991-1002 (1995), and Scott *et al.*, *Science* 274:2065-2069 (1996)) led to the realization that the A^{15.1}-U^{16.1} interaction is a non-standard base pair with a single hydrogen bond between the exocyclic amine (N6) of the adenosine and the 4-oxo group of the uridine. Modeling studies (based on the crystal structure) then led to the discovery that the interaction of the wild-type A^{15.1}-U^{16.1} base pair
0 can be spatially mimicked by replacement with an I^{15.1}-C^{16.1} base pair that adopts an isostructural orientation and which preserves the required contact of the 2-keto group of C^{16.1} with A⁶ of the uridine turn. In the model, the polarity of the stabilizing hydrogen

bond between positions 15.1 and 16.1 is reversed in the $I^{15.1}\text{-}C^{16.1}$ interaction, but the correct orientation of the bases around this bond is maintained.

- It has been discovered that hammerhead ribozyme analogues containing an inosine at position 15.1 readily cleave RNA substrates containing an $N^{16.2}C^{16.1}H^{17}$ triplet. Based on this, disclosed are compositions, preferably synthetic oligomers, which cleave a nucleic acid target sequence containing the triplet $N^{16.2}C^{16.1}H^{17}$. It is preferred that H^{17} is not guanosine, however, under certain circumstances, NCG triplet containing RNA can be cleaved by the ribozymes of the instant invention. The ability to cleave substrates having $N^{16.2}C^{16.1}X^{17}$ triplets effectively doubles the number of targets available for cleavage by compositions of the type disclosed.

Example 10: Synthesis of 1-(beta-D-xylofuranosyl)-xypoxanthine phosphoramidite

- Referring to **Figure 9**, Inosine (**1**) was 5'-O-monomethoxytritylated and 2'-O-silylated under standard conditions to afford **2** (Charubala, R; Pfeleiderer, W. *Heterocycles* **1990**, *30*, 1141). Oxidation/reduction procedure afforded **3** in moderate yield (Matulic-Adamic, J.; Daniher, A.T.; Gonzalez, C.; Beigelman, L. *Bioorg. Med. Chem. Lett.* **1999**, *9*, 157): $^1\text{H NMR}$ (CDCl_3) δ 12.80 (br s, 1H, NH), 8.11 (s, 1H, H-8), 8.08 (s, 1H, H-2), 7.45-6.80 (m, 14H, trityl), 5.85 (d, $J_{1',2'} = 1.6$, 1H, H-1'), 4.83 (d, $J_{2',3'} = 7.2$, 1H, H-2'), 4.46 (br s, 1H, 3'-OH), 4.34 (m, 1H, H-4'), 4.06 (m, 1H, H-3'), 3.77 (s, 6H, 2 x OMe), 3.60 (app d, 2H, H-5', H-5''), 0.89 (s, 9H, *t*-Bu), 0.07 (s, 3H, Me), 0.06 (s, 3H, Me).

Standard phosphorylation of **3** afforded the desired phosphoramidite **4**.

More acid stable 5'-O-MMT group is used in this particular case because applicant found that 5'-O-DMT protection is more labile in xylo nucleoside series than in ribo nucleoside series.

- The xylo-inosine was incorporated into oligonucleotides using the standard procedures known in the art and as described herein.

Example 11: Activity of the xylo-Inosine-modified NCH Ribozyme

- Several NCH ribozymes with xylo-inosine at position 15.1 were designed (**Figure 7**) to cleave RNA containing GCA, ACA, UCA or the CCA triplet. These ribozymes were

synthesized and purified as described herein and tested using standard RNA cleavage reaction conditions (see **Table 31**, for example, and see below).

The ribozymes were chemically synthesized. The method of synthesis used followed the procedure for normal RNA synthesis as described above and in Usman et al., (1987 J.

- 5 Am. Chem. Soc., 109, 7845), Scaringe et al., (1990 Nucleic Acids Res., 18, 5433) and Wincott et al., *supra*, and made use of common nucleic acid protecting and coupling groups, such as dimethoxytrityl at the 5'-end, and phosphoramidites at the 3'-end. The average stepwise coupling yields were >98%.

- 10 Ribozymes were purified by gel electrophoresis using general methods or were purified by high pressure liquid chromatography (HPLC; See Wincott et al., *supra*; the totality of which is hereby incorporated herein by reference) and were resuspended in water. The sequences of the chemically synthesized ribozymes used in this study are shown below in **Table 33**.

- Cleavage Reactions:* Full-length or partially full-length, internally-labeled target
15 RNA for ribozyme cleavage assay is prepared by *in vitro* transcription in the presence of [α - 32 P] CTP, passed over a G 50 Sephadex column by spin chromatography and used as substrate RNA without further purification. Alternately, substrates were 5'- 32 P-end labeled using T4 polynucleotide kinase enzyme. Assays are performed by pre-warming a 2X concentration of purified ribozyme in ribozyme cleavage buffer (50 mM Tris-HCl, pH
20 7.5 at 37°C, 10 mM MgCl₂) and the cleavage reaction was initiated by adding the 2X ribozyme mix to an equal volume of substrate RNA (maximum of 1-5 nM) that was also pre-warmed in cleavage buffer. As an initial screen, assays are carried out for 1 hour at 37°C using a final concentration of 40 nM or 1 mM ribozyme, *i.e.*, ribozyme excess. The reaction is quenched by the addition of an equal volume of 95% formamide, 20 mM
25 EDTA, 0.05% bromophenol blue and 0.05% xylene cyanol after which the sample is heated to 95°C for 2 minutes, quick chilled and loaded onto a denaturing polyacrylamide gel. Substrate RNA and the specific RNA cleavage products generated by ribozyme cleavage are visualized on an autoradiograph of the gel. The percentage of cleavage is determined by Phosphor Imager[®] quantitation of bands representing the intact substrate
30 and the cleavage products.

The results of the experiments are summarized in Table 32, which shows that NCH-xylo ribozymes are catalytically active to cleave target RNA.

Example 12: Activity of NCH Ribozyme variants

- 5 The nucleic acid molecules of the instant invention allow for the ability to cleave a new set of 12 NCH triplets. Determination of single turnover rate constants at pH 6 of these ribozymes in the all ribo form show that with NCA type triplets, the cleavage rate is higher than at NUA sites. NCC and NUC site rates are similar, and NCU sites are slightly lower than NUU sites. Additional measurements of multiple turnover parameters of the all
- 0 ribo ribozymes performed under non-saturating conditions using 5nM ribozyme and changing the substrate concentration from 50 to 500 nM at pH 7.4 with 10 mM Mg⁺⁺ at 37 °C gave Km = 100 nM and kcat = 6.5 min⁻¹ for GCA vs Km = 30 nM and kcat = 2.0 min⁻¹ for GUA cleaving all ribo ribozymes. These data verify that the ribozymes with an I•C base pair are efficient catalysts in multiple turnover reactions and the relative order of
- 5 activity between NCH and NUH cleavers established at pH 6 (Ludwig *et al.*, 1998, *Nucleic Acids Res.*, 26, 2279-2285) remains unchanged.

- To gain more insight into the structural requirements of the 15.1- 16.1 base pair of the ribozymes of the instant invention, applicant synthesized several variants of the active I-15.1 •C-16.1 structure and tested these ribozyme analogues with their corresponding
- 0 substrates. The influence of several core stabilization strategies on the activity of the NCH cleaving ribozymes was also investigated.

- Various nucleoside analogs were incorporated at position 15.1 of the ribozyme. Cleavage activity was tested with the complementary FI* labeled substrates at pH 7.4 in the presence of 10 mM Mg⁺⁺ under conditions of ribozyme excess (i.e. single turnover
- 5 conditions). The modified oligonucleotides were synthesized by standard oligonucleotide synthesis procedures. Xanthosine was protected using O-2, O-4 pivaloyloxymethyl groups; N,N-dimethylguanosine with 6-O-(2-nitrophenyl)-ethyl and 6-thio-inosine with S-cyanoethyl protecting groups. The cleavage activity of the ribozymes containing the 15.1 analogs is summarized in Figure 36. For comparison Figure 37 summarizes reported
- 0 functional group modification studies performed at the A 15.1 residue in the A-15.1 •U-16.1 context of NUH cleaving ribozymes.

Modifications at the purine 15.1 N1 and/or C6 positions (Figure 36 A, B, C)

In the 6-thio-inosine (A) (sl) 15.1 substituted ribozyme, the original (I-15.1) position 6 O•H-N (C-16.1) bonds are replaced by weaker (sl-15.1) position 6 S•H-N (C-16.1) hydrogen bonds while all other functional groups remain unchanged. Ribozymes with an adenosine (B) at position 15.1 (A-15.1) are inactive with C-16.1 substrates since the ribozyme geometry requires the [A-15.1] position 6 amino group and the [C-16.1] position 4 amino group hydrogen-bond donor functional groups to be in close proximity. Similarly, low activity is observed with I-15.1 ribozymes and U-16.1 substrates, where the [I-15.1] position 6 keto and [C-16.1] position 4 keto hydrogen-bond acceptor groups are opposed (Figure 37, B). Although inosine can form stable mismatch pairs with uridine in RNA duplexes or in tRNA anticodon-mRNA interactions, these results suggest that the geometry in the I•U mismatches differ from that of the A•U (or I•C) base pair in the active NUH ribozyme. Substitution of N1-Methyl-inosine (C) in place of inosine at position 15.1 leads to complete loss of cleavage activity.

Modifications at the purine 15.1 C2 and/or N3 position (Figure 36 D, E, F)

The extremely low activity observed with the G-15.1 (D) substituted analog may be explained by the formation of a G-C Watson-Crick base pair. The replacement of the I•C pair with a G•C pair can significantly distort the geometry at the 15.1-16.1 position. G-15.1 N2-alkylation (E) gives only minimal recovery of catalytic activity compared to G-15.1, suggesting that the steric problems introduced by the bulky N-methyl groups may interfere with stacking interactions. The activity of this construct is significantly less than that of iso-G-15.1 (Figure 37, E) containing ribozymes in the standard A-U context. Xanthosine 15.1 (F) contains the same functional groups as inosine at the N1 and C6 sites but contains an additional hydrogen-bond donor site at position N3 along with a C2 carbonyl group. The complete lack of activity seen with this construct reinforces the importance of the purine N3 acceptor functionality in transition state formation. Similarly, 3-deaza-adenosine (Figure 37, F) containing ribozymes were also inactive. The C2 carbonyl of the 15.1 purine shows no significant negative interference in iso-guanosine containing 15.1 ribozymes.

Activity of modified core variants

To complete the characterization of the I•C pair containing ribozymes, the acceptance of various core substitution patterns was tested. Short substrates containing GCH and GUH (H= non G) triplets were compared using 3 different modified ribozymes.

- 5 The acceptance of the U-4 2'-O-alkyl substituent is the greatest with GCA triplets while U-4= 2'-deoxy-2'-amino uridine and U-4= ribo uridine substituted ribozymes show a similar level of activity with NCH and NUH triplets. The results of this comparison are summarized in Table 64. In addition, a ribozyme construct in which ribo inosine replaces adenosine at positions 14 and 15.1 was tested which demonstrated cleavage activity.

- 10 Apart from the A-15.1 •U-16.1 to I-15 .1 •C-16.1 change that reverses the polarity of an important H-bond in the ribozyme structure, no other functional group changes at the 15.1 purine residue seem to be compatible with the requirements of efficient catalysis. The I-15.1 and A-15.1 ribozymes are equally suitable for practical applications because there are only minor differences in the acceptance of stabilizing
15 residues.

Example 13: Activity of NCH Ribozyme to inhibit HER2 gene expression

Applicant has designed, synthesized and tested several NCH ribozymes and HH ribozymes targeted against HER2 RNA (see, for example, Tables 31 and 34) in cell
20 proliferation assays.

- Proliferation assay:** The model proliferation assay used in the study can require a cell plating density of 2000 cells/well in 96-well plates and at least 2 cell doublings over a 5-day treatment period. To calculate cell density for proliferation assays, the FIPS (fluoro-imaging processing system) method well in the art was used. This method allows for cell
25 density measurements after nucleic acids are stained with CyQuant® dye, and has the advantage of accurately measuring cell densities over a very wide range 1,000-100,000 cells/well in 96-well format.

- Ribozymes (50-200 nM) were delivered in the presence of cationic lipid at 2.0 µg/mL and inhibition of proliferation was determined on day 5 post-treatment. Two full
30 ribozyme screens were completed and 4 lead HH and 11 lead NCH ribozymes were chosen for further testing. Of the 15 lead Rzs chosen from primary screens, 4 NCH and 1

- HH Rzs continued to inhibit cell proliferation in subsequent experiments. NCH Rzs against sites, 2001 (RPI No. 17236), 2783 (RPI No. 17249), 2939 (RPI No. 17251) or 3998 (RPI No. 17262) caused inhibition of proliferation ranging from 25-60% as compared to a scrambled control Rz (1A; RPI No. 17263). Of the five lead Rzs, the most efficacious is the NCH Rz (RPI No. 17251) against site 2939 of HER2 RNA. An example of results from cell culture assay is shown in Figure 3. Referring to Figure 3, NCH ribozymes and a HH ribozyme targeted against HER2 RNA are shown to cause significant inhibition of proliferation of cells. This shows that ribozymes, for instance, the NCH ribozymes are capable of inhibiting HER2 gene expression in mammalian cells.

0

Example 14: Activity of NCH Ribozyme to inhibit PKC alpha gene expression

- The Protein Kinase C family contains twelve currently known isozymes divided into three classes: the classic, Ca^{++} dependent (PKC α , β I, β II, γ), the novel, non- Ca^{++} dependent (PKC δ , ϵ , μ , η , θ) and the atypical (PKC ξ , ι/λ); all of which are
- serine/threonine kinases. These isozymes show distinct and overlapping tissue, cellular, and subcellular distribution. They aid in the regulation of cell growth and differentiation through their response to second messenger products of lipid metabolism (Blobe, *et al.*, 1996, *Cancer Surveys*, 27, 213-248). These second messengers include diacylglycerol (DAG), inositol-triphosphate (IP3), lysophospholipids, free fatty acids, and phosphatidate which act directly or in addition to changes in the Ca^{++} concentration. A simple model for PKC α activation follows a two step mechanism. First, membrane association of PKC α is through Ca^{++} and phospholipid interactions and second, the kinase is activated by interaction with DAG. An example of a signal cascade subsequent to PKC activation is PKC's phosphorylation of c-Raf, which phosphorylates MEK, which phosphorylates MAP, which phosphorylates transcription factors such as Jun and thereby activates a mitogenic program in the nucleus. There are numerous substrates for the various PKC's, one which for PKC α ultimately stimulates transcription factors that activate P-glycoprotein (P-gp) causing the multi-drug resistant phenotype (MDR) (Blobe, *et al.*, 1994, *Cancer and Metastasis Reviews*, 13, 411-431).

Cell Culture Review

- PKC's have been implicated in tumor promotion since the discovery that these molecules can serve as receptors for tumor-promoting phorbol esters. An increase in PKC overexpression in numerous tumor cell lines and tumor tissues has also been
- 5 demonstrated. PKC overexpression has been shown to be associated with increased invasion and metastasis in mouse Lewis lung carcinoma, mouse B16 melanoma (Lee *et al.*, 1997, *Molecular Carcinogenesis*, 18, 44-53), mouse mammary adenocarcinoma, mouse fibrosarcoma, human lung carcinoma (Wang and Liu, 1998, *Acta Pharmacologica Sinica*, 19, 265-268), human bladder carcinoma, human pancreatic cancer (Denham *et al.*, 1998,
- 0 *Surgery*, 124, 218-223), and human gastric cancer (Dean *et al.*, 1996, *Cancer Research*, 56, 3499-3507). Mounting evidence suggests PKC α can stimulate adhesion molecule expression and can directly act on these membrane bound species as substrates, thereby modulating cellular adhesion to the extracellular matrix and increasing metastatic potential. Furthermore, human surgical specimens have demonstrated elevated PKC in breast
- 5 tumors, thyroid carcinomas and melanomas (Becker *et al.*, 1990, *Oncogene*, 5, 1133-1139).

- Utz *et al.*, 1994, *Int. J. Cancer*, 57, 104-110, describe a cell proliferation assay in which small molecule inhibitors of PKC demonstrate anti-proliferative activity in CCRF-VCR 1000 and KB-8511 cells with the multidrug resistant (MDR) phenotype. PKC α is
- 0 overexpressed in tumor tissues that express the MDR phenotype. This phenotype is associated with the expression of a 170 kDa broad specificity drug efflux pump, P-gp. PKC α phosphorylation of P-gp has been shown *in vitro*. In addition, PKC expression correlates with resistance to doxorubicin and high P-gp levels in human renal carcinoma and non-small cell lung carcinoma. Inhibitors of PKC partially reverse the MDR
- 5 phenotype and decrease phosphorylation of P-gp (Caponigro *et al.*, 1997, *Anti-Cancer Drugs*, 8, 26-33).

- Dean *et al.*, 1994, *Journal of Biological Chemistry*, 269, 16416-24, describe cell culture studies in which antisense targeting of PKC α resulted in the potent inhibition of mRNA and protein expression in human lung carcinoma (A549) cells. In this study, PKC
- 0 α inhibition resulted in the reduced induction of intercellular adhesion molecule 1 (ICAM-1) mRNA by phorbol esters.

Yano *et al.*, 1999, *Endocrinology*, 140, 4622-4632, describe a cell proliferation study in which down regulation of different PKC isoforms, including PKC α , results in the inhibition of insulin like growth factor I induced vascular smooth muscle cell proliferation, migration, and gene expression.

- 5 Wang *et al.*, 1999, *Experimental Cell Research*, 250, 253-263, describe cell culture studies in which antisense inhibition of PKC α results in the reversal of the transformed phenotype in human lung carcinoma (LTEPa-2) cells. In this study, the amounts of PKC α protein and total PKC activity were decreased when compared to control cells.

- Sioud and Sorensen, 1998, *Nature Biotechnology*, 16, 556-561, describe
0 hammerhead ribozyme inhibition of PKC α in rat glioma cell lines (BT4C and BT4Cn). This study demonstrated inhibition of malignant glioma cell proliferation along with the inhibition of regulatory Bcl-x_L protein expression. Bcl-x_L is overexpressed in glioma cells and is an apoptosis inhibitor. The ribozyme mediated inhibition of cell proliferation presumably results from apoptosis induction of transformed glioma cells through
5 suppression of PKC α and Bcl-x_L (Leirdal and Sioud, 1999, *British J. of Cancer*, 80, 1558-1564).

Animal Models

- Evaluating the efficacy of anti-PKC α agents in animal models is an important prerequisite to human clinical trials. A variety of mouse xenograft models using human
0 tumor cell lines have been developed using cell lines which express high levels of PKC α protein. McGraw *et al.*, 1997, *Anti-Cancer Drug Design*, 12, 315-326, describe mouse xenograft models using human breast (MDA MB-321), prostate (Du-145), colon (Colo 205, WiDr), lung (NCI H69, H209, J460, H520, A549), bladder (T-24), and melanoma (SK-mel 1) carcinoma cells. Antisense oligonucleotides targeting PKC α administered
5 intravenously following s.c. transplanted tumor cells resulted in dose dependant decreases in tumor size when compared to controls in most cases. Similar studies using T-24 bladder carcinoma, non-small cell lung carcinoma (A549), and Colo 205 colon carcinoma mouse xenografts are described in Dean *et al.*, 1996, *Biochemical Society Transactions*, 24, 623. Sioud and Sorensen, 1998, *Nature Biotechnology*, 16, 556-561, describe a rat model
0 in which inbred syngeneic BDIX rats were inoculated subcutaneously with BT4Cn glioma cells. After approximately three weeks, rats were treated with a single injection of

ribozyme targeting PKC α resulting in inhibition of tumor growth as determined by tumor size and/or weight when compared to controls. The above studies provide proof that inhibition of PKC α expression by anti-PKC α agents causes inhibition of tumor growth in animals. Lead anti-PKC α ribozymes chosen from *in vitro* assays can be further tested in mouse xenograft models. Ribozymes can be first tested alone and then in combination with standard chemotherapies.

Animal Model Development

Human lung (A549, NCI H520) tumor and breast (MDA-MB 231) cell lines can be characterized to establish their growth curves in mice. These cell lines have been implanted into both nude and SCID mice and primary tumor volumes are measured 3 times per week. Growth characteristics of these tumor lines using a Matrigel implantation format can also be established. In addition, the use of other cell lines that have been engineered to express high levels of PKC α can also be used. The tumor cell line(s) and implantation method that supports the most consistent and reliable tumor growth can be used in animal studies to test promising PKC α ribozyme(s). Ribozymes can be administered by daily subcutaneous injection or by continuous subcutaneous infusion from Alzet mini osmotic pumps beginning 3 days after tumor implantation and continuing for the duration of the study. Group sizes of at least 10 animals are employed. Efficacy is determined by statistical comparison of tumor volume of ribozyme-treated animals to a control group of animals treated with saline alone. Because the growth of these tumors is generally slow (45-60 days), an initial endpoint will be the time in days it takes to establish an easily measurable primary tumor (i.e. 50-100 mm³) in the presence or absence of ribozyme treatment.

Clinical Summary

Overview

Ribozymes targeting PKC α have strong potential to develop into useful therapeutics directed towards numerous cancer types. Lung cancer is the leading cause of cancer deaths for both men and women in the USA. The incidence of lung cancer in the United States is ~172,000 cases per year, accounting for 14% of cancer diagnoses. Approximately 158,000 die each year of lung cancer, accounting for 28% of all cancer deaths. Numerous other

indications exist including cancers of the bladder, colon, breast, prostate, and ovary in addition to melanoma and glioblastoma.

McGraw *et al.*, 1997, *Anti-Cancer Drug Design*, 12, 315-326, describe a Phase I trial for ISIS 3521/CGP 64128A, a PKC alpha antisense construct. In this trial, ISIS 3521/CGP 64128A was administered as either a two-hour i.v. infusion three times per week for three consecutive weeks, or as a continuous i.v. infusion for twenty-one consecutive days. The authors report that patients demonstrated excellent tolerance to the antisense compound when administered at doses of up to 2.5 mg/kg by the two-hour i.v. infusion and at 1.5 mg/kg/day by continuous i.v. infusion. In patients receiving the two-hour i.v. infusion schedule, the post-infusion plasma concentration of the compound increased proportional to the dose, and metabolites were determined to have been cleared rapidly from plasma with a half-life of thirty to forty-five minutes. These metabolites were composed of chain-shortened oligonucleotides, consistent with exonuclease-mediated degradation. No evidence of accumulation, induction, or inhibition of metabolism was found after the administration of repetitive doses.

Therapy

Treatment options for lung cancer are determined by the type and stage of the cancer and include surgery, radiation therapy, and chemotherapy. For many localized cancers, surgery is usually the treatment of choice. Because the disease has usually spread by the time it is discovered, radiation therapy and chemotherapy are often needed in combination with surgery. Chemotherapy alone or combined with radiation has replaced surgery as the treatment of choice for small cell lung cancer; on this regimen, a large percentage of patients experience remission, which in some cases is long-lasting. The 1-year relative survival rates for lung cancer have increased from 32% in 1973 to 41% in 1994, largely due to improvements in surgical techniques. The 5-year relative survival rate for all stages combined is only 14%. The survival rate is 50% for cases detected when the disease is still localized, but only 15% of lung cancers are discovered that early.

Common chemotherapies include various combinations of cytotoxic drugs to kill the cancer cells. These drugs include paclitaxel (Taxol), docetaxel, cisplatin, methotrexate, cyclophosphamide, doxorubin, fluorouracil *etc.* Significant toxicities are associated with these cytotoxic therapies. Well-characterized toxicities include nausea and vomiting,

myelosuppression, alopecia and mucosity. Serious cardiac problems are also associated with certain of the combinations, *e.g.* doxorubin and paclitaxel, but are less common.

Applicant has designed several NCH ribozymes targeted against PKC α RNA (Genebank accession No NM_002737) (see, for example, **Table 63**). These ribozymes are used first in a proliferation assay that is used to select ribozyme leads.

Proliferation assay: The model proliferation assay useful in the study can require a cell plating density of 2000 cells/well in 96-well plates and at least 2 cell doublings over a 5-day treatment period. To calculate cell density for proliferation assays, the FIPS (fluoro-imaging processing system) method well known in the art can be used. This method allows for cell density measurements after nucleic acids are stained with CyQuant $\text{\textcircled{R}}$ dye, and has the advantage of accurately measuring cell densities over a very wide range 1,000-100,000 cells/well in 96-well format.

Ribozymes (50-200 nM) are delivered in the presence of cationic lipid at 2.0 $\mu\text{g/mL}$ and inhibition of proliferation is determined on day 5 post-treatment. Two full ribozyme screens are usually completed and lead ribozymes are chosen for further testing. Of the lead ribozymes chosen from primary screens, ribozymes which continue to inhibit cell proliferation in subsequent experiments are selected for PKC α RNA and protein inhibition studies.

Example 15: Nucleoside Triphosphates and their incorporation into oligonucleotides

The synthesis of nucleotide triphosphates and their incorporation into nucleic acids using polymerase enzymes has greatly assisted in the advancement of nucleic acid research. The polymerase enzyme utilizes nucleotide triphosphates as precursor molecules to assemble oligonucleotides. Each nucleotide is attached by a phosphodiester bond formed through nucleophilic attack by the 3' hydroxyl group of the oligonucleotide's last nucleotide onto the 5' triphosphate of the next nucleotide. Nucleotides are incorporated one at a time into the oligonucleotide in a 5' to 3' direction. This process allows RNA to be produced and amplified from virtually any DNA or RNA templates.

Most natural polymerase enzymes incorporate standard nucleotide triphosphates into nucleic acid. For example, a DNA polymerase incorporates dATP, dTTP, dCTP, and dGTP into DNA and an RNA polymerase generally incorporates ATP, CTP, UTP, and

GTP into RNA. There are however, certain polymerases that are capable of incorporating non-standard nucleotide triphosphates into nucleic acids (Joyce, 1997, *PNAS* 94, 1619-1622, Huang et al., *Biochemistry* 36, 8231-8242).

Before nucleosides can be incorporated into RNA transcripts using polymerase enzymes they must first be converted into nucleotide triphosphates which can be recognized by these enzymes. Phosphorylation of unblocked nucleosides by treatment with POCl_3 and trialkyl phosphates was shown to yield nucleoside 5'-phosphorodichloridates (Yoshikawa et al., 1969, *Bull. Chem. Soc. (Japan)* 42, 3505). Adenosine or 2'-deoxyadenosine 5'-triphosphate was synthesized by adding an additional step consisting of treatment with excess tri-n-butylammonium pyrophosphate in DMF followed by hydrolysis (Ludwig, 1981, *Acta Biochim. et Biophys. Acad. Sci. Hung.* 16, 131-133).

Non-standard nucleotide triphosphates are not readily incorporated into RNA transcripts by traditional RNA polymerases. Mutations have been introduced into RNA polymerase to facilitate incorporation of deoxyribonucleotides into RNA (Sousa & Padilla, 1995, *EMBO J.* 14, 4609-4621, Bonner et al., 1992, *EMBO J.* 11, 3767-3775, Bonner et al., 1994, *J. Biol. Chem.* 42, 25120-25128, Aurup et al., 1992, *Biochemistry* 31, 9636-9641).

McGee et al., International PCT Publication No. WO 95/35102, describes the incorporation of 2'- NH_2 -NTP's, 2'-F-NTP's, and 2'-deoxy-2'-benzyloxyamino UTP into RNA using bacteriophage T7 polymerase.

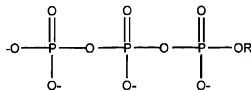
Wieczorek et al., 1994, *Bioorganic & Medicinal Chemistry Letters* 4, 987-994, describes the incorporation of 7-deaza-adenosine triphosphate into an RNA transcript using bacteriophage T7 RNA polymerase.

Lin et al., 1994, *Nucleic Acids Research* 22, 5229-5234, reports the incorporation of 2'- NH_2 -CTP and 2'- NH_2 -UTP into RNA using bacteriophage T7 RNA polymerase and polyethylene glycol containing buffer. The article describes the use of the polymerase synthesized RNA for *in vitro* selection of aptamers to human neutrophil elastase (HNE).

This invention relates to novel nucleotide triphosphate (NTP) molecules, and their incorporation into nucleic acid molecules, including nucleic acid catalysts. The NTPs of the instant invention are distinct from other NTPs known in the art. The invention further relates to incorporation of these nucleotide triphosphates into oligonucleotides using an RNA polymerase; the invention further relates to novel transcription conditions for the

incorporation of modified (non-standard) and unmodified NTP's, into nucleic acid molecules. Further, the invention relates to methods for synthesis of novel NTP's

In a first aspect, the invention features NTP's having the formula triphosphate-OR, for example the following formula 3:



5

- where R is any nucleoside; specifically the nucleosides 2'-*O*-methyl-2,6-diaminopurine riboside; 2'-deoxy-2'-amino-2,6-diaminopurine riboside; 2'-(*N*-alanyl) amino-2'-deoxy-uridine; 2'-(*N*-phenylalanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-(*N*-β-alanyl) amino ; 2'-deoxy-2'-(lysyl) amino uridine; 2'-*C*-allyl uridine; 2'-*O*-amino-uridine; 2'-*O*-methylthiomethyl adenosine; 2'-*O*-methylthiomethyl cytidine ; 2'-*O*-methylthiomethyl guanosine; 2'-*O*-methylthiomethyl-uridine; 2'-deoxy-2'-(*N*-histidyl) amino uridine; 2'-deoxy-2'-amino-5-methyl cytidine; 2'-(*N*-β-carboxamidine-β-alanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-(*N*-β-alanyl)-guanosine; 2'-*O*-amino-adenosine; 2'-(*N*-lysyl)amino-2'-deoxy-cytidine; 2'-Deoxy-2'-(*L*-histidine) amino Cytidine; 5-Imidazoleacetic acid 2'-deoxy uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropynyl]-2'-*O*-methyl uridine, 5-(3-aminopropynyl)-2'-*O*-methyl uridine, 5-(3-aminopropyl)-2'-*O*-methyl uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropyl]-2'-*O*-methyl uridine, 5-(3-aminopropyl)-2'-deoxy-2-fluoro uridine, 2'-Deoxy-2'-(β-alanyl-*L*-histidyl)amino uridine, 2'-deoxy-2'-β-alaninamido-uridine, 3-(2'-deoxy-2'-fluoro-β-*D*-ribofuranosyl)piperazino[2,3-*D*]pyrimidine-2-one, 5-[3-(*N*-4-imidazoleacetyl)aminopropyl]-2'-deoxy-2'-fluoro uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropynyl]-2'-deoxy-2'-fluoro uridine, 5-*E*-(2-carboxyvinyl)-2'-deoxy-2'-fluoro uridine, 5-[3-(*N*-4-aspartyl)aminopropynyl]-2'-fluoro uridine, 5-(3-aminopropyl)-2'-deoxy-2-fluoro cytidine, and 5-[3-(*N*-4-succinyl)aminopropyl]-2'-deoxy-2-fluoro cytidine.

5

In a second aspect, the invention features inorganic and organic salts of the nucleoside triphosphates of the instant invention.

In a third aspect, the invention features a process for the synthesis of pyrimidine nucleotide triphosphate (such as UTP, 2'-*O*-MTM-UTP, dUTP and the like) including the steps of monophosphorylation where the pyrimidine nucleoside is contacted with a mixture having a phosphorylating agent (such as phosphorus oxychloride, phospho-tris-triazolides, phospho-tris-triimidazolides and the like), trialkyl phosphate (such as triethylphosphate or trimethylphosphate or the like) and a hindered base (such as dimethylaminopyridine, DMAP and the like) under conditions suitable for the formation of pyrimidine monophosphate; and pyrophosphorylation where the pyrimidine monophosphate is contacted with a pyrophosphorylating reagent (such as tributylammonium pyrophosphate) under conditions suitable for the formation of pyrimidine triphosphates.

By "nucleotide triphosphate" or "NTP" is meant a nucleoside bound to three inorganic phosphate groups at the 5' hydroxyl group of the modified or unmodified ribose or deoxyribose sugar where the 1' position of the sugar may comprise a nucleic acid base or hydrogen. The triphosphate portion may be modified to include chemical moieties which do not destroy the functionality of the group (*i.e.*, allow incorporation into an RNA molecule).

In another preferred embodiment, nucleotide triphosphates (NTPs) of the instant invention are incorporated into an oligonucleotide using an RNA polymerase enzyme. RNA polymerases include but are not limited to mutated and wild type versions of bacteriophage T7, SP6, or T3 RNA polymerases. Applicant has also found that the NTPs of the present invention can be incorporated into oligonucleotides using certain DNA polymerases, such as Taq polymerase.

In yet another preferred embodiment, the invention features a process for incorporating modified NTP's into an oligonucleotide including the step of incubating a mixture having a DNA template, RNA polymerase, NTP, and an enhancer of modified NTP incorporation under conditions suitable for the incorporation of the modified NTP into the oligonucleotide.

By "enhancer of modified NTP incorporation" is meant a reagent which facilitates the incorporation of modified nucleotides into a nucleic acid transcript by an RNA polymerase. Such reagents include, but are not limited to, methanol, LiCl, polyethylene glycol (PEG), diethyl ether, propanol, methyl amine, ethanol, and the like.

In another preferred embodiment, the modified nucleotide triphosphates can be incorporated by transcription into a nucleic acid molecules including enzymatic nucleic acid, antisense, 2-5A antisense chimera, oligonucleotides, triplex forming oligonucleotide (TFO), aptamers and the like (Stull *et al.*, 1995 *Pharmaceutical Res.* 12, 465).

- 5 By "triplex forming oligonucleotides (TFO)" it is meant an oligonucleotide that can bind to a double-stranded DNA in a sequence-specific manner to form a triple-strand helix. Formation of such triple helix structure has been shown to inhibit transcription of the targeted gene (Duval-Valentin *et al.*, 1992 *Proc. Natl. Acad. Sci. USA* 89, 504).

- 10 In yet another preferred embodiment, the modified nucleotide triphosphates of the instant invention can be used for combinatorial chemistry or *in vitro* selection of nucleic acid molecules with novel function. Modified oligonucleotides can be enzymatically synthesized to generate libraries for screening.

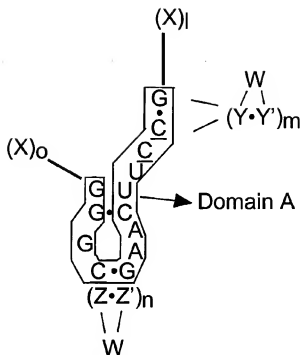
- 15 In another preferred embodiment, the invention features nucleic acid based techniques (e.g., enzymatic nucleic acid molecules), antisense nucleic acids, 2-5A antisense chimeras, triplex DNA, antisense nucleic acids containing RNA cleaving chemical groups) isolated using the methods described in this invention and methods for their use to diagnose, down regulate or inhibit gene expression.

- 20 In yet another preferred embodiment, the invention features enzymatic nucleic acid molecules targeted against HER2 RNA, specifically including ribozymes in the class II (zincyme) motif.

- 25 Targets, for example HER2 RNA, for useful ribozymes and antisense nucleic acids can be determined, for example, as described in Draper *et al.*, WO 93/23569; Sullivan *et al.*, WO 93/23057; Thompson *et al.*, WO 94/02595; Draper *et al.*, WO 95/04818; McSwiggen *et al.*, US Patent Nos. 5,525,468 and 5,646,042, all are hereby incorporated by reference herein in their totalities. Other examples include the following PCT applications, which concern inactivation of expression of disease-related genes: WO 95/23225, and WO 95/13380; all of which are incorporated by reference herein.

- 30 In yet another preferred embodiment, the invention features a process for incorporating a plurality of compounds of formula 3.

- 35 In yet another embodiment, the invention features a nucleic acid molecule with catalytic activity having formula 4:

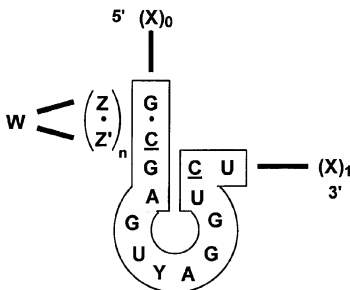


In the formula shown above X, Y, and Z represent independently a nucleotide or a non-nucleotide linker, which may be same or different; • indicates hydrogen bond

- 5 formation between two adjacent nucleotides which may or may not be present; Y' is a nucleotide complementary to Y; Z' is a nucleotide complementary to Z; l is an integer greater than or equal to 3 and preferably less than 20, more specifically 4, 5, 6, 7, 8, 9, 10, 11, 12, or 15; m is an integer greater than 1 and preferably less than 10, more specifically 2, 3, 4, 5, 6, or 7; n is an integer greater than 1 and preferably less than 10, more
- 10 specifically 3, 4, 5, 6, or 7; o is an integer greater than or equal to 3 and preferably less than 20, more specifically 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 15; l and o may be the same length ($l = o$) or different lengths ($l \neq o$); each $X(l)$ and $X(o)$ are oligonucleotides which are of sufficient length to stably interact independently with a target nucleic acid sequence (the target can be an RNA, DNA or RNA/DNA mixed polymers); W is a linker of ≥ 2
- 15 nucleotides in length or may be a non-nucleotide linker; A, U, C, and G represent the nucleotides; G is a nucleotide, preferably 2'-O-methyl or ribo; A is a nucleotide, preferably 2'-O-methyl or ribo; U is a nucleotide, preferably 2'-amino (e.g., 2'-NH₂ or 2'-O-NH₂), 2'-O-methyl or ribo; \underline{C} represents a nucleotide, preferably 2'-amino (e.g., 2'-NH₂ or 2'-O-

NH₂), and _____ represents a chemical linkage (e.g. a phosphate ester linkage, amide linkage, phosphorothioate, phosphorodithioate or others known in the art).

In yet another embodiment, the invention features a nucleic acid molecule with catalytic activity having formula 5:



- 5 In the formula shown above X, Y, and Z represent independently a nucleotide or a non-nucleotide linker, which may be same or different; • indicates hydrogen bond formation between two adjacent nucleotides which may or may not be present; Z' is a nucleotide complementary to Z; l is an integer greater than or equal to 3 and preferably less than 20, more specifically 4, 5, 6, 7, 8, 9, 10, 11, 12, or 15; n is an integer greater than
- 10 1 and preferably less than 10, more specifically 3, 4, 5, 6, or 7; o is an integer greater than or equal to 3 and preferably less than 20, more specifically 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, or 15; l and o may be the same length (l = o) or different lengths (l ≠ o); each X_l and X_o are oligonucleotides which are of sufficient length to stably interact independently with a target nucleic acid sequence (the target can be an RNA, DNA or RNA/DNA mixed
- 15 polymers); X_o preferably has a G at the 3'-end, X_l preferably has a G at the 5'-end; W is a linker of ≥ 2 nucleotides in length or may be a non-nucleotide linker; Y is a linker of ≥ 1 nucleotides in length, preferably G, 5'-CA-3', or 5'-CAA-3', or may be a non-nucleotide linker; A, U, C, and G represent nucleotides; G is a nucleotide, preferably 2'-O-methyl, 2'-deoxy-2'-fluoro, or 2'-OH; A is a nucleotide, preferably 2'-O-methyl, 2'-deoxy-2'-

fluoro, or 2'-OH; U is a nucleotide, preferably 2'-O-methyl, 2'-deoxy-2'-fluoro, or 2'-OH; C represents a nucleotide, preferably 2'-amino (e.g., 2'-NH₂ or 2'-O-NH₂, and _____ represents a chemical linkage (e.g. a phosphate ester linkage, amide linkage, phosphorothioate, phosphorodithioate or others known in the art).

- 5 The enzymatic nucleic acid molecules of Formula 4 and Formula 5 may independently comprise a cap structure which may independently be present or absent.

- In yet another preferred embodiment, the 3'-cap is selected from a group comprising, 4',5'-methylene nucleotide; 1-(beta-D-erythrofuransyl) nucleotide; 4'-thio nucleotide; carbocyclic nucleotide; 5'-amino-alkyl phosphate; 1,3-diamino-2-propyl phosphate; 3-aminopropyl phosphate; 6-aminohexyl phosphate; 1,2-aminododecyl phosphate; 10 hydroxypropyl phosphate; 1,5-anhydrohexitol nucleotide; L-nucleotide; alpha-nucleotide; modified base nucleotide; phosphorodithioate; *threo*-pentofuranosyl nucleotide; acyclic 3',4'-seco nucleotide; 3,4-dihydroxybutyl nucleotide; 3,5-dihydroxypentyl nucleotide; 5'-5'-inverted nucleotide moiety; 5'-5'-inverted abasic moiety; 5'-phosphoramidate; 5'-phosphorothioate; 1,4-butanediol phosphate 5'-amino; bridging and/or non-bridging 5'-phosphoramidate, phosphorothioate and/or phosphorodithioate; bridging or non bridging methylphosphonate and 5'-mercapto moieties (for more details, see Beaucage and Iyer, 1993, *Tetrahedron* 49, 1925; incorporated by reference herein).

- In another aspect, the invention provides mammalian cells containing one or more 20 nucleic acid molecules and/or expression vectors of this invention. The one or more nucleic acid molecules may independently be targeted to the same or different sites.

Nucleotide Synthesis

- Addition of dimethylaminopyridine (DMAP) to the phosphorylation protocols 25 known in the art can greatly increase the yield of nucleotide monophosphates while decreasing the reaction time. Synthesis of the nucleosides of the invention have been described in several publications and Applicants previous applications (Beigelman *et al.*, International PCT publication No. WO 96/18736; Dudzcy *et al.*, Int. PCT Pub. No. WO 95/11910; Usman *et al.*, Int. PCT Pub. No. WO 95/13378; Matulic-Adamic *et al.*, 1997, *Tetrahedron Lett.* 38, 203; Matulic-Adamic *et al.*, 1997, *Tetrahedron Lett.* 38, 1669; all of which are incorporated herein by reference). These nucleosides are dissolved in triethyl phosphate and chilled in an ice bath. Phosphorus oxychloride (POCl₃) is then added

followed by the introduction of DMAP. The reaction is then warmed to room temperature and allowed to proceed for 5 hours. This reaction allows the formation of nucleotide monophosphates which can then be used in the formation of nucleotide triphosphates.

Tributylamine is added followed by the addition of anhydrous acetonitrile and

- 5 tributylammonium pyrophosphate. The reaction is then quenched with TEAB and stirred overnight at room temperature (about 20°C). The triphosphate is purified using Sephadex® column purification or equivalent and/or HPLC and the chemical structure is confirmed using NMR analysis. Those skilled in the art will recognize that the reagents, temperatures of the reaction, and purification methods can easily be alternated with
- 10 substitutes and equivalents and still obtain the desired product.

Nucleotide Triphosphates

The invention provides nucleotide triphosphates which can be used for a number of different functions. The nucleotide triphosphates formed from nucleosides found in **Table**

- 15 **45** are unique and distinct from other nucleotide triphosphates known in the art. Incorporation of modified nucleotides into DNA or RNA oligonucleotides can alter the properties of the molecule. For example, modified nucleotides can hinder binding of nucleases, thus increasing the chemical half-life of the molecule. This is especially important if the molecule is to be used for cell culture or *in vivo*. It is known in the art that
- 20 the introduction of modified nucleotides into these molecules can greatly increase the stability and thereby the effectiveness of the molecules (Burgin *et al.*, 1996, *Biochemistry* 35, 14090-14097; Usman *et al.*, 1996, *Curr. Opin. Struct. Biol.* 6, 527-533).

Modified nucleotides are incorporated using either wild type or mutant polymerases.

For example, mutant T7 polymerase is used in the presence of modified nucleotide

- 25 triphosphate(s), DNA template and suitable buffers. Those skilled in the art will recognize that other polymerases and their respective mutant versions can also be utilized for the incorporation of NTP's of the invention. Nucleic acid transcripts were detected by incorporating radiolabelled nucleotides (α -³²P NTP). The radiolabeled NTP contained the same base as the modified triphosphate being tested. The effects of methanol, PEG and
- 30 LiCl were tested by adding these compounds independently or in combination. Detection and quantitation of the nucleic acid transcripts was performed using a Molecular Dynamics

PhosphorImager. Efficiency of transcription was assessed by comparing modified nucleotide triphosphate incorporation with all-ribonucleotide incorporation control. Wild-type polymerase was used to incorporate NTP's using the manufacturer's buffers and instructions (Boehringer Mannheim).

Transcription Conditions

Incorporation rates of modified nucleotide triphosphates into oligonucleotides can be increased by adding to traditional buffer conditions, several different enhancers of modified NTP incorporation. Applicant has utilized methanol and LiCl in an attempt to increase incorporation rates of dNTP using RNA polymerase. These enhancers of modified NTP incorporation can be used in different combinations and ratios to optimize transcription. Optimal reaction conditions differ between nucleotide triphosphates and can readily be determined by standard experimentation. Overall, however, Applicant has found that inclusion of enhancers of modified NTP incorporation such as methanol or inorganic compound such as lithium chloride increase the mean transcription rates.

Applicant synthesized pyrimidine nucleotide triphosphates using DMAP in the reaction. For purines, applicant utilized standard protocols previously described in the art (Yoshikawa *et al supra*; Ludwig, *supra*). Described below is one example of a pyrimidine nucleotide triphosphate and one purine nucleotide triphosphate synthesis.

Synthesis of purine nucleotide triphosphates: 2'-O-methyl-guanosine-5'-triphosphate

2'-O-methyl guanosine nucleoside (0.25 grams, 0.84 mmol) was dissolved in triethyl phosphate (5.0) ml by heating to 100°C for 5 minutes. The resulting clear, colorless solution was cooled to 0°C using an ice bath under an argon atmosphere. Phosphorous oxychloride (1.8 eq., 0.141 ml) was then added to the reaction mixture with vigorous stirring. The reaction was monitored by HPLC, using a sodium perchlorate gradient. After 5 hours at 0°C, tributylamine (0.65 ml) was added followed by the addition of anhydrous acetonitrile (10.0 ml), and after 5 minutes (reequilibration to 0°C) tributylammonium pyrophosphate (4.0 eq., 1.53 g) was added. The reaction mixture was quenched with 20 ml of 2M TEAB after 15 minutes at 0°C (HPLC analysis with above conditions showed consumption of monophosphate at 10 minutes) then stirred overnight at room temperature, the mixture was evaporated *in vacuo* with methanol co-evaporation

(4x) then diluted in 50 ml 0.05M TEAB. DEAE sephadex purification was used with a gradient of 0.05 to 0.6 M TEAB to obtain pure triphosphate (0.52 g, 66.0% yield) (elutes around 0.3M TEAB); the purity was confirmed by HPLC and NMR analysis.

5 Synthesis of Pyrimidine nucleotide triphosphates: 2'-O-methylthiomethyl-uridine-5'-triphosphate

2'-O-methylthiomethyl uridine nucleoside (0.27 grams, 1.0 mmol) was dissolved in triethyl phosphate (5.0 ml). The resulting clear, colorless solution was cooled to 0°C with an ice bath under an argon atmosphere. Phosphorus oxychloride (2.0 eq., 0.190 ml) was then added to the reaction mixture with vigorous stirring. Dimethylaminopyridine (DMAP, 0.2eq., 25 mg) was added, the solution warmed to room temperature and the reaction was monitored by HPLC, using a sodium perchlorate gradient. After 5 hours at 20°C, tributylamine (1.0 ml) was added followed by anhydrous acetonitrile (10.0 ml), and after 5 minutes tributylammonium pyrophosphate (4.0 eq., 1.8 g) was added. The reaction mixture was quenched with 20 ml of 2M TEAB after 15 minutes at 20°C (HPLC analysis with above conditions showed consumption of monophosphate at 10 minutes) then stirred overnight at room temperature. The mixture was evaporated *in vacuo* with methanol co-evaporation (4x) then diluted in 50 ml 0.05M TEAB. DEAE fast flow Sepharose purification with a gradient of 0.05 to 1.0 M TEAB was used to obtain pure triphosphate (0.40 g, 44% yield) (elutes around 0.3M TEAB) as determined by HPLC and NMR analysis.

Utilization of DMAP in Uridine 5'-Triphosphate Synthesis

The reactions were performed on 20 mg aliquots of nucleoside dissolved in 1 ml of triethyl phosphate and 19 ul of phosphorus oxychloride. The reactions were monitored at 40 minute intervals automatically by HPLC to generate yield-of-product curves at times up to 18 hours. A reverse phase column and ammonium acetate/ sodium acetate buffer system (50mM & 100mM respectively at pH 4.2) was used to separate the 5', 3', 2' monophosphates (the monophosphates elute in that order) from the 5'-triphosphate and the starting nucleoside. The data is shown in Table 46. These conditions doubled the product yield and resulted in a 10-fold improvement in the reaction time to maximum yield (1200 minutes down to 120 minutes for a 90% yield). Selectivity for 5'-monophosphorylation

was observed for all reactions. Subsequent triphosphorylation occurred in nearly quantitative yield.

Materials Used in Bacteriophage T7 RNA Polymerase Reactions

5 **Buffer 1:** Reagents are mixed together to form a 10X stock solution of buffer 1 (400 mM Tris-Cl [pH 8.1], 200 mM MgCl₂, 100 mM DTT, 50 mM spermidine, and 0.1% triton® X-100). Prior to initiation of the polymerase reaction methanol, LiCl is added and the buffer is diluted such that the final reaction conditions for condition 1 consisted of : 40mM tris (pH 8.1), 20mM MgCl₂, 10 mM DTT, 5 mM spermidine, 0.01% triton® X-100, 10% methanol, and 1 mM LiCl.

10 **BUFFER 2:** Reagents are mixed together to form a 10X stock solution of buffer 2 (400 mM Tris-Cl [pH 8.1], 200 mM MgCl₂, 100 mM DTT, 50 mM spermidine, and 0.1% triton® X-100). Prior to initiation of the polymerase reaction PEG, LiCl is added and the buffer is diluted such that the final reaction conditions for buffer 2 consisted of : 40mM tris (pH 8.1), 20mM MgCl₂, 10 mM DTT, 5 mM spermidine, 0.01% triton® X-100, 4% PEG, and 1 mM LiCl.

15 **BUFFER 3:** Reagents are mixed together to form a 10X stock solution of buffer 3 (400 mM Tris-Cl [pH 8.0], 120 mM MgCl₂, 50 mM DTT, 10 mM spermidine and 0.02% triton® X-100). Prior to initiation of the polymerase reaction PEG is added and the buffer is diluted such that the final reaction conditions for buffer 3 consisted of : 40mM tris (pH 8.0), 12 mM MgCl₂, 5 mM DTT, 1 mM spermidine, 0.002% triton® X-100, and 4% PEG.

20 **BUFFER 4:** Reagents are mixed together to form a 10X stock solution of buffer 4 (400 mM Tris-Cl [pH 8.0], 120 mM MgCl₂, 50 mM DTT, 10 mM spermidine and 0.02% triton® X-100). Prior to initiation of the polymerase reaction PEG, methanol is added and the buffer is diluted such that the final reaction conditions for buffer 4 consisted of : 40mM tris (pH 8.0), 12 mM MgCl₂, 5 mM DTT, 1 mM spermidine, 0.002% triton® X-100, 10% methanol, and 4% PEG.

25 **BUFFER 5:** Reagents are mixed together to form a 10X stock solution of buffer 5 (400 mM Tris-Cl [pH 8.0], 120 mM MgCl₂, 50 mM DTT, 10 mM spermidine and 0.02% triton® X-100). Prior to initiation of the polymerase reaction PEG, LiCl is added and the buffer is diluted such that the final reaction conditions for buffer 5 consisted of : 40mM

tris (pH 8.0), 12 mM MgCl₂, 5 mM DTT, 1 mM spermidine, 0.002% triton® X-100, 1 mM LiCl and 4% PEG.

BUFFER 6: Reagents are mixed together to form a 10X stock solution of buffer 6 (400 mM Tris-Cl [pH 8.0], 120 mM MgCl₂, 50 mM DTT, 10 mM spermidine and 0.02% triton® X-100). Prior to initiation of the polymerase reaction PEG, methanol is added and the buffer is diluted such that the final reaction conditions for buffer 6 consisted of : 40mM tris (pH 8.0), 12 mM MgCl₂, 5 mM DTT, 1 mM spermidine, 0.002% triton® X-100, 10% methanol, and 4% PEG.

BUFFER 7: Reagents are mixed together to form a 10X stock solution of buffer 6 (400 mM Tris-Cl [pH 8.0], 120 mM MgCl₂, 50 mM DTT, 10 mM spermidine and 0.02% triton® X-100). Prior to initiation of the polymerase reaction PEG, methanol and LiCl is added and the buffer is diluted such that the final reaction conditions for buffer 6 consisted of : 40mM tris (pH 8.0), 12 mM MgCl₂, 5 mM DTT, 1 mM spermidine, 0.002% triton® X-100, 10% methanol, 4% PEG, and 1 mM LiCl.

Screening of Modified nucleotide triphosphates with Mutant T7 RNA Polymerase

Modified nucleotide triphosphates were tested in buffers 1 through 6 at two different temperatures (25 and 37°C). Buffers 1-6 tested at 25°C were designated conditions 1-6 and buffers 1-6 tested at 37°C were designated conditions 7-12 (**Table 47**). In each condition, Y639F mutant T7 polymerase (Sousa and Padilla, *supra*) (0.3-2 mg/20 ml reaction), NTP's (2 mM each), DNA template (10 pmol), inorganic pyrophosphatase (5U/ml) and α -³²P NTP (0.8 mCi/pmol template) were combined and heated at the designated temperatures for 1-2 hours. The radiolabeled NTP used was different from the modified triphosphate being testing. The samples were resolved by polyacrylamide gel electrophoresis. Using a PhosphorImager (Molecular Dynamics, Sunnyvale, CA), the amount of full-length transcript was quantified and compared with an all-RNA control reaction. The data is presented in **Table 48**; results in each reaction are expressed as a percent compared to the all-ribonucleotide triphosphate (rNTP) control. The control was run with the mutant T7 polymerase using commercially available polymerase buffer (Boehringer Mannheim, Indianapolis, IN).

Incorporation of Modified NTP's using Wild-type T7 RNA polymerase

Bacteriophage T7 RNA polymerase was purchased from Boehringer Mannheim at 0.4 U/ μ L concentration. Applicant used the commercial buffer supplied with the enzyme and 0.2 μ Ci alpha- 32 P NTP in a 50 μ L reaction with nucleotides triphosphates at 2 mM each. The template was a double-stranded PCR fragment, which was used in previous screens. Reactions were carried out at 37°C for 1 hour. Ten μ L of the sample was run on a 7.5% analytical PAGE and bands were quantitated using a PhosphorImager. Results are calculated as a comparison to an "all ribo" control (non-modified nucleotide triphosphates) and the results are in **Table 49**.

10 Incorporation of Multiple Modified nucleotide triphosphates Into Oligonucleotides

Combinations of modified nucleotide triphosphates were tested with the transcription protocol described above, to determine the rates of incorporation of two or more of these triphosphates. Incorporation of 2'-Deoxy-2'-(L-histidine) amino uridine (2'-his-NH₂-UTP) was tested with unmodified cytidine nucleotide triphosphates, rATP and rGTP in reaction condition number 9. The data is presented as a percentage of incorporation of modified NTP's compared to the all rNTP control and is shown in **Table 50a**.

Two modified cytidines (2'-NH₂-CTP or 2'-dCTP) were incorporated along with 2'-his-NH₂-UTP with identical efficiencies. 2'-his-NH₂-UTP and 2'-NH₂-CTP were then tested with various unmodified and modified adenosine triphosphates in the same buffer (**Table 50b**). The best modified adenosine triphosphate for incorporation with both 2'-his-NH₂-UTP and 2'-NH₂-CTP was 2'-NH₂-DAPTP.

Optimization of Reaction conditions for Incorporation of Modified Nucleotide

25 Triphosphate

The combination of 2'-his-NH₂-UTP, 2'-NH₂-CTP, 2'-NH₂-DAP, and rGTP was tested in several reaction conditions (**Table 51**) using the incorporation protocol described above. The results demonstrate that of the buffer conditions tested, incorporation of these modified nucleotide triphosphates occur in the presence of both methanol and LiCl.

Selection of Novel Enzymatic nucleic acid molecule Motifs using 2'-deoxy-2' amino Modified GTP and CTP

For selection of new enzymatic nucleic acid molecule motifs, pools of enzymatic nucleic acid molecules were designed to have two substrate binding arms (5 and 16 nucleotides long) and a random region in the middle. The substrate has a biotin on the 5' end, 5 nucleotides complementary to the short binding arm of the pool, an unpaired G (the desired cleavage site), and 16 nucleotides complementary to the long binding arm of the pool. The substrate was bound to column resin through an avidin-biotin complex. The general process for selection is shown in **Figure 11**. The protocols described below represent one possible method that may be utilized for selection of enzymatic nucleic acid molecules and are given as a non-limiting example of enzymatic nucleic acid molecule selection with combinatorial libraries.

Construction of Libraries:

The oligonucleotides listed below were synthesized by Operon Technologies (Alameda, CA). Templates were gel purified and then run through a Sep-Pak™ cartridge (Waters, Millford, MA) using the manufacturers protocol. Primers (MST3, MST7c, MST3del) were used without purification.

Primers:

MST3 (30 mer): 5'-CAC TTA GCA TTA ACC CTC ACT AAA GGC CGT-3'
 MST7c (33 mer): 5'-TAA TAC GAC TCA CTA TAG GAA AGG TGT GCA ACC-3'
 MST3del (18 mer): 5'-ACC CTC ACT AAA GGC CGT-3'

Templates:

MSN60c (93 mer): 5'-ACC CTC ACT AAA GGC CGT (N)₆₀ GGT TGC ACA CCT

TTG-3'

MSN40c (73 mer): 5'-ACC CTC ACT AAA GGC CGT (N)₄₀ GGT TGC ACA CCT
 TTG-3'

MSN20c (53 mer): 5'-ACC CTC ACT AAA GGC CGT (N)₂₀ GGT TGC ACA CCT
 TTG-3'

N60 library was constructed using MSN60c as a template and MST3/MST7c as primers. N40 and N20 libraries were constructed using MSN40c (or MSN20c) as template and MST3del/MST7c as primers.

Single-stranded templates were converted into double-stranded DNA by the following protocol: 5 nmol template, 10 nmol each primer, in 10 ml reaction volume using standard PCR buffer, dNTP's, and taq DNA polymerase (all reagents from Boehringer Mannheim). Synthesis cycle conditions were 94°C, 4 minutes; (94°C, 1 minute; 42°C, 1 minute; 72°C, 2 minutes) x 4; 72°C, 10 minutes. Products were checked on agarose gel to confirm the length of each fragment (N60=123 bp, N40=91 bp, N20=71 bp) and then were phenol/chloroform extracted and ethanol precipitated. The concentration of the double-stranded product was 25 µM.

Transcription of the initial pools was performed in a 1 ml volume comprising: 500 pmol double-stranded template (3×10^{14} molecules), 40 mM tris-HCl (pH 8.0), 12 mM MgCl₂, 1 mM spermidine, 5 mM DTT, 0.002% triton X-100, 1 mM LiCl, 4% PEG 8000, 10% methanol, 2 mM ATP (Pharmacia), 2 mM GTP (Pharmacia), 2 mM 2'-deoxy-2'-amino-CTP (USB), 2 mM 2'-deoxy-2'-amino-UTP (USB), 5 U/ml inorganic pyrophosphatase (Sigma), 5 U/µl T7 RNA polymerase (USB; Y639F mutant was used in some cases at 0.1 mg/ml (Sousa and Padilla, *supra*)), 37°C, 2 hours. Transcribed libraries were purified by denaturing PAGE (N60=106 ntds, N40=74, N20=54) and the resulting product was desalted using Sep-Pak™ columns and then ethanol precipitated.

Initial column-Selection:

The following biotinylated substrate was synthesized using standard protocols (Usman *et al.*, 1987 *J. Am. Chem. Soc.*, 109, 7845; Scaringe *et al.*, 1990 *Nucleic Acids Res.*, 18, 5433; and Wincott *et al.*, 1995 *Nucleic Acids Res.* 23, 2677-2684):

5'-biotin-C18 spacer-GCC GUG GGU UGC ACA CCU UUC C-C18 spacer-thiol-modifier C6 S-S-inverted abasic-3'

Substrate was purified by denaturing PAGE and ethanol precipitated. 10 nmol of substrate was linked to a NeutrAvidin™ column using the following protocol: 400 µl UltraLink Immobilized NeutrAvidin™ slurry (200 µl beads, Pierce, Rockford, IL) were loaded into a polystyrene column (Pierce). The column was washed twice with 1 ml of binding buffer (20 mM NaPO₄ (pH 7.5), 150 mM NaCl) and then capped off (i.e., a cap was put on the bottom of the column to stop the flow). 200 µl of the substrate suspended in binding buffer was applied and allowed to incubate at room temperature for 30 minutes

- with occasional vortexing to ensure even linking and distribution of the solution to the resin. After the incubation, the cap was removed and the column was washed with 1 ml binding buffer followed by 1 ml column buffer (50 mM tris-HCL (pH 8.5), 100 mM NaCl, 50 mM KCl). The column was then ready for use and capped off. 1 nmol of the initial
- 5 pool RNA was loaded on the column in a volume of 200 μ l column buffer. It was allowed to bind the substrate by incubating for 30 minutes at room temperature with occasional vortexing. After the incubation, the cap was removed and the column was washed twice with 1 ml column buffer and capped off. 200 μ l of elution buffer (50 mM tris-HCL (pH 8.5), 100 mM NaCl, 50 mM KCl, 25 mM $MgCl_2$) was applied to the column followed by
- 10 30 minute incubation at room temperature with occasional vortexing. The cap was removed and four 200 μ l fractions were collected using elution buffer.

Second column (counter selection):

- A diagram for events in the second column is generally shown in **Figure 12** and
- 15 substrate oligonucleotide used is shown below:

5'-GGU UGC ACA CCU UUC C-C18 spacer-biotin-inverted abasic-3'

- This column substrate was linked to UltraLink NeutrAvidin™ resin as previously described (40 pmol) which was washed twice with elution buffer. The eluent from the first column purification was then run on the second column. The use of this column
- 20 allowed for binding of RNA that non-specifically diluted from the first column, while RNA that performed a catalytic event and had product bound to it, flowed through the second column. The fractions were ethanol precipitated using glycogen as carrier and rehydrated in sterile water for amplification.

25 Amplification:

- RNA and primer MST3 (10-100 pmol) were denatured at 90°C for 3 minutes in water and then snap-cooled on ice for one minute. The following reagents were added to the tube (final concentrations given): 1X PCR buffer (Boehringer Mannheim), 1 mM dNTP's (for PCR, Boehringer Mannheim), 2 U/ μ l RNase-Inhibitor (Boehringer
- 30 Mannheim), 10 U/ μ l Superscript™ II Reverse Transcriptase (BRL). The reaction was incubated for 1 hour at 42°C, then at 95°C for 5 minutes in order to destroy the

- Superscript™. The following reagents were then added to the tube to increase the volume five-fold for the PCR step (final concentrations/amounts given): MST7c primer (10-100 pmol, same amount as in RT step), 1X PCR buffer, taq DNA polymerase (0.025-0.05 U/μl, Boehringer Mannheim). The reaction was cycled as follows: 94°C, 4minutes; 5 (94°C, 30s; 42-54°C, 30s; 72°C, 1minute) x 4-30 cycles; 72°C, 5minutes; 30°C, 30 minutes. Cycle number and annealing temperature were decided on a round by round basis. In cases where heteroduplex was observed, the reaction was diluted five-fold with fresh reagents and allowed to progress through 2 more amplification cycles. Resulting products were analyzed for size on an agarose gel (N60=123 bp, N40=103 bp, N20=83 bp) 10 and then ethanol precipitated.

Transcriptions:

- Transcription of amplified products was done using the conditions described above with the following modifications: 10-20% of the amplification reaction was used as 15 template, reaction volume was 100-500 μl, and the products sizes varied slightly (N60=106 ntds, N40=86, N20=66). A small amount of ³²P-GTP was added to the reactions for quantitation purposes.

Subsequent rounds:

- 20 Subsequent rounds of selection used 20 pmols of input RNA and 40 pmol of the 22 nucleotide substrate on the column.

Activity of pools:

- 25 Pools were assayed for activity under single turnover conditions every three to four rounds. Activity assay conditions were as follows: 50 mM tris-HCl (pH 8.5), 25 mM MgCl₂, 100 mM NaCl, 50 mM KCl, trace ³²P-labeled substrate, 10 nM RNA pool. 2X pool in buffer and, separately, 2X substrate in buffer were incubated at 90°C for 3 minutes, then at 37°C for 3 minutes. Equal volume 2X substrate was then added the 2X pool tube (t=0). Initial assay time points were taken at 4 and 24 hours: 5 μl was removed and 30 quenched in 8 μl cold Stop buffer (96% formamide, 20 mM EDTA, 0.05% bromophenyl blue/xylene cyanol). Samples were heated 90°C, 3 minutes, and loaded on a 20%

sequencing gel. Quantitation was performed using a Molecular Dynamics Phosphorimager and ImageQuaNT™ software. The data is shown in **Table 52**.

- Samples from the pools of oligonucleotide were cloned into vectors and sequenced using standard protocols (Sambrook *et al.*, *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratory Press). The enzymatic nucleic acid molecules were transcribed from a representative number of these clones using methods described in this application. Individuals from each pool were tested for RNA cleavage from N60 and N40 by incubating the enzymatic nucleic acid molecules from the clones with 5/16 substrate in 2mM MgCl₂, pH 7.5, 10mM KCl at 37°C. The data in **Table 54** shows that the enzymatic nucleic acid molecules isolated from the pool are individually active.

Kinetic Activity:

- Kinetic activity of the enzymatic nucleic acid molecule shown in **Table 54**, was determined by incubating enzymatic nucleic acid molecule (10 nM) with substrate in a cleavage buffer (pH 8.5, 25 mM MgCl₂, 100 mM NaCl, 50 mM KCl) at 37°C.

Magnesium Dependence:

- Magnesium dependence of round 15 of N20 was tested by varying MgCl₂ while other conditions were held constant (50 mM tris [pH 8.0], 100 mM NaCl, 50 mM KCl, single turnover, 10 nM pool). The data is shown in **Table 55**, which demonstrates increased activity with increased magnesium concentrations.

Selection of Novel Enzymatic nucleic acid molecule Motifs using 2'-Deoxy-2'-(N-histidyl) amino UTP, 2'-Fluoro-ATP, and 2'-deoxy-2'-amino CTP and GTP

- The method used for selection of novel enzymatic nucleic acid molecule motifs using 2'-deoxy-2'-amino modified GTP and CTP was repeated using 2'-Deoxy-2'-(N-histidyl) amino UTP, 2'-Fluoro-ATP, and 2'-deoxy-2'-amino CTP and GTP. However, rather than causing cleavage on the initial column with MgCl₂, the initial random modified-RNA pool was loaded onto substrate-resin in the following buffer; 5 mM NaOAc pH 5.2, 1 M NaCl at 4° C. After ample washing, the resin was moved to 22° C and the buffer switch 20 mM HEPES pH 7.4, 140 mM KCl, 10 mM NaCl, 1 mM CaCl₂, 1 mM MgCl₂. In one selection of N60 oligonucleotides, no divalent cations (MgCl₂,

CaCl₂) was used. The resin was incubated for 10 minutes to allow reaction and the eluant collected.

The enzymatic nucleic acid molecule pools were capable of cleaving 1-3% of the present substrate even in the absence of divalent cations, the background (in the absence of modified pools) was 0.2 - 0.4 %.

Synthesis of 5-substituted 2'-modified nucleosides

When designing monomeric nucleoside triphosphates for selection of therapeutic catalytic RNAs, one has to take into account nuclease stability of such molecules in biological sera. A common approach to increase RNA stability is to replace the sugar 2'-OH group with other groups like 2'-fluoro, 2'-O-methyl or 2'-amino. Fortunately such 2'-modified pyrimidine 5'triphosphates are shown to be substrates for RNA polymerases. (Aurup, H.; Williams, D.M.; Eckstein, F. *Biochemistry* **1992**, *31*, 9637; and Padilla, R.; Sousa, R. *Nucleic Acids Res.* **1999**, *27*, 1561.) On the other hand it was shown that variety of substituents at pyrimidine 5-position is well tolerated by T7 RNA polymerase (Tarasow, T.M.; Eaton, B.E. *Biopolymers* **1998**, *48*, 29), most likely because the natural hydrogen-bonding pattern of these nucleotides is preserved. We have chosen 2'-fluoro and 2'-O-methyl pyrimidine nucleosides as starting materials for attachment of different functionalities to the 5-position of the base. Both rigid (alkynyl) and flexible (alkyl) spacers are used. The choice of imidazole, amino and carboxylate pendant groups is based on their ability to act as general acids, general bases, nucleophiles and metal ligands, all of which can improve the catalytic effectiveness of selected nucleic acids. **Figures 21 – 24** relate to the synthesis of these compounds.

2'-O-methyluridine was 3',5'-bis-acetylated using acetic anhydride in pyridine and then converted to its 5-iodo derivative **1a** using I₂/ceric ammonium nitrate reagent (Asakura, J.; Robins, M.J. *J. Org. Chem.* **1990**, *55*, 4928) (Scheme 1). Both reactions proceeded in a quantitative yield and no chromatographic purifications were needed. Coupling between **1** and *N*-trifluoroacetyl propargylamine using copper(I) iodide and tetrakis(triphenylphosphine)palladium(0) catalyst as described by Hobbs (Hobbs, F.W., Jr. *J. Org. Chem.* **1989**, *54*, 3420) yielded **2a** in 89% yield. Selective *O*-deacylation with aqueous NaOH afforded **3a** which was phosphorylated with POCl₃/triethylphosphate

(TEP) in the presence of 1,8-bis(dimethylamino)naphthalene (Proton-Sponge) (Method A) (Kovácz, T; Ötvös, L. *Tetrahedron Lett.* **1988**, 29, 4525). The intermediate nucleoside phosphorodichloridate was condensed *in situ* with tri-*n*-butylammonium pyrophosphate. At the end, the *N*-TFA group was removed with concentrated ammonia. 5'-Triphosphate
5 was purified on Sephadex® DEAE A-25 ion exchange column using a linear gradient of 0.1-0.8M triethylammonium bicarbonate (TEAB) for elution. Traces of contaminating inorganic pyrophosphate are removed using C-18 RP HPLC to afford analytically pure material. Conversion into Na-salt was achieved by passing the aqueous solution of triphosphate through Dowex 50WX8 ion exchange resin in Na⁺ form to afford **4a** in 45%
10 yield. When Proton-Sponge was omitted in the first phosphorylation step, yields were reduced to 10-20%. Catalytic hydrogenation of **3a** yielded 5-aminopropyl derivative **5a** which was phosphorylated under conditions identical to those described for propynyl derivative **3a** to afford triphosphate **6a** in 50% yield.

For the preparation of imidazole derivatized triphosphates **9a** and **11a**, we
15 developed an efficient synthesis of *N*-diphenylcarbamoyl 4-imidazoleacetic acid (ImAADPC): Transient protection of carboxyl group as TMS-ester using TMS-Cl/pyridine followed by DPC-Cl allowed for a clean and quantitative conversion of 4-imidazoleacetic acid (ImAA) to its *N*-DPC protected derivative.

Complete deacylation of **2a** afforded 5-(3-aminopropynyl) derivative **8a** which
20 was condensed with 4-imidazoleacetic acid in the presence of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide (EDC) to afford **9a** in 68% yield. Catalytic hydrogenation of **8a** yielded 5-(3-aminopropyl) derivative **10a** which was condensed with ImAADPC to yield conjugate **11a** in 32% yield. Yields in these couplings were greatly improved when 5'-OH was protected with DMT group (not shown) thus
25 efficiently preventing undesired 5'-*O*-esterification. Both **9a** and **11a** failed to yield triphosphate products in reaction with POCl₃/TEP/Proton-Sponge.

On the contrary, phosphorylation of 3'-*O*-acetylated derivatives **12a** and **13a** using 2-chloro-4*H*-1,3,2-benzodioxaphosphorin-4-one followed by pyrophosphate addition and oxidation (Method B, Scheme 2; Ludwig, J., Eckstein, F., *J. Org. Chem.* 1989, 54,
30 631) afforded the desired triphosphates **14a** and **15a** in 57% yield, respectively.

2'-Deoxy-2'-fluoro nucleoside 5'-triphosphates containing amino- (**4b**, **6b**) and imidazole- (**14b**, **15b**) linked groups were synthesized in a manner analogous to that described for the preparation of 2'-*O*-methyl nucleoside 5'-triphosphates (Schemes 1 and 2). Again, only Ludwig-Eckstein's phosphorylation worked for the preparation of 4-imidazoleacetyl derivatized triphosphates.

It is worth noting that when "one-pot-two-steps" phosphorylation reaction (Kovácz, T; Ötvös, L. *Tetrahedron Lett.* **1988**, *29*, 4525) of **5b** was quenched with 40% aqueous methylamine instead of TEAB or H₂O, the γ -amidate **7b** was generated as the only detectable product. Similar reaction was reported recently for the preparation of the γ -amidate of pppA2'p5'A2'p5'A.¹²

Carboxylate group was introduced into 5-position of uridine both on the nucleoside level and post-synthetically (Method C) (Scheme 3). 5-Iodo-2'-deoxy-2'-fluorouridine (**16**) was coupled with methyl acrylate using modified Heck reaction¹³ to yield **17** in 85% yield. 5'-*O*-Dimethoxytritylation, followed by *in situ* 3'-*O*-acetylation and subsequent detritylation afforded 3'-protected derivative **18**. Phosphorylation using 2-chloro-4*H*-1,3,2-benzodioxaphosphorin-4-one followed by pyrophosphate addition and oxidation (Ludwig, J.; Eckstein, F. *J. Org. Chem.* **1989**, *54*, 631) afforded the desired triphosphate in 54% yield. On the other hand, 5-(3-aminopropyl)uridine 5'-triphosphate **6b** was coupled with *N*-hydroxysuccinimide ester of Fmoc-Asp-OFm to afford, after removal of Fmoc and Fm groups with diethylamine, the desired aminoacyl conjugate **20** in 50% yield.

Cytidine derivatives comprising 3-aminopropyl and 3(*N*-succinyl)aminopropyl groups were synthesized according to Scheme 4. Peracylated 5-(3-aminopropynyl)uracil derivative **2b** is reduced using catalytic hydrogenation and then converted in seven steps and 5% overall yield into 3'-acetylated cytidine derivative **25**. This synthesis was plagued by poor solubility of intermediates and formation of the N⁴-cyclized byproduct during ammonia treatment of the 4-triazolyl intermediate. Phosphorylation of **25** as described in reference 11 yielded triphosphate **26** and N⁴-cyclized product **27** in 1:1 ratio. They were easily separated on Sephadex DEAE A-25 ion exchange column using 0.1-0.8M TEAB gradient. It appears that under basic conditions the free primary amine can displace any remaining intact 4-NHBz group leading to the cyclized product. This is similar to displacement of 4-triazolyl group by primary amine as mentioned above.

We reasoned that utilization of *N*⁴-unprotected cytidine will solve this problem. This lead to an improved synthesis of **26**: Iodination of 2'-deoxy-2'-fluorocytidine (**28**) provided the 5-iodo derivative **29** in 58% yield. This compound was then smoothly converted into 5-(3-aminopropynyl) derivative **30**. Hydrogenation afforded 5-(3-aminopropyl) derivative **31** which was phosphorylated directly with POCl₃/PPi to afford **26** in 37% yield. Coupling of the 5'-triphosphate **26** with succinic anhydride yielded succinylated derivative **32** in 36% yield.

Synthesis of 5-Imidazoleacetic acid 2'-deoxy-5'-triphosphate uridine

5-dintrophenylimidazoleacetic acid 2'-deoxy uridine nucleoside (80 mg) was dissolved in 5 ml of triethylphosphate while stirring under argon, and the reaction mixture was cooled to 0°C. Phosphorus oxychloride (1.8 eq, 22 ml) was added to the reaction mixture at 0°C, three more aliquots were added over the course of 48 hours at room temperature. The reaction mixture was then diluted with anhydrous MeCN (5 ml) and cooled to 0°C, followed by the addition of tributylamine (0.65 ml) and tributylammonium pyrophosphate (4.0 eq, 0.24 g). After 45 minutes, the reaction was quenched with 10 ml aq. methyl amine for four hours. After co-evaporation with MeOH (3x), purified material on DEAE Sephadex followed by RP chromatography to afford 15 mg of triphosphate.

Synthesis of 2'-(*N*-lysyl)-amino-2'-deoxy-cytidine Triphosphate

2'-(*N*-lysyl)-amino-2'-deoxy cytidine (0.180 g, 0.22 mmol) was dissolved in triethyl phosphate (2.00 ml) under Ar. The solution was cooled to 0 °C in an ice bath. Phosphorus oxychloride (99.999%, 3 eq., 0.0672 mL) was added to the solution and the reaction was stirred for two hours at 0 °C. Tributylammonium pyrophosphate (4 eq., 0.400 g) was dissolved in 3.42 mL of acetonitrile and tributylamine (0.165 mL). Acetonitrile (1 mL) was added to the monophosphate solution followed by the pyrophosphate solution which was added dropwise. The resulting solution was clear. The reaction was allowed to warm up to room temperature. After stirring for 45 minutes, methylamine (5 mL) was added and the reaction and stirred at room temperature for 2 hours. A biphasic mixture appeared (little beads at the bottom of the flask). TLC (7:1:2 iPrOH:NH₄OH:H₂O) showed the appearance of triphosphate material. The solution was concentrated, dissolved in water and loaded on a newly prepared DEAE Sephadex A-25 column. The column was washed with a gradient up to 0.6 M TEAB buffer and the product eluted off in fractions

90-95. The fractions were analyzed by ion exchange HPLC. Each fraction showed one triphosphate peak that eluted at ~4.000 minutes. The fractions were combined and pumped down from methanol to remove buffer salt to yield 15.7 mg of product.

Synthesis of 2'-deoxy-2'-(L-histidine)amino Cytidine Triphosphate

- 5 2'-[*N*-Fmoc, *N*^{*imid*}-dinitrophenyl-histidyl]amino-2'-cytidine (0.310 g, 4.04 mmol) was dissolved in triethyl phosphate (3 ml) under Ar. The solution was cooled to 0 °C. Phosphorus oxychloride (1.8 eq., 0.068 mL) was added to the solution and stored overnight in the freezer. The next morning TLC (10% MeOH in CH₂Cl₂) showed significant starting material, one more equivalent of POCl₃ was added. After two hours,
- 10 TLC still showed starting material. Tributylamine (0.303 mL) and Tributylammonium pyrophosphate (4 eq., 0.734 g) dissolved in 6.3 mL of acetonitrile (added dropwise) were added to the monophosphate solution. The reaction was allowed to warm up to room temperature. After stirring for 15 min, methylamine (10 mL) was added at room temperature and stirring continued for 2 hours. TLC (7:1:2 iPrOH:NH₄OH:H₂O) showed
- 15 the appearance of triphosphate material. The solution was concentrated, dissolved in water and loaded on a DEAE Sephadex A-25 column. The column was washed with a gradient up to 0.6 M TEAB buffer and the product eluted off in fractions 170-179. The fractions were analyzed by ion exchange HPLC. Each fraction showed one triphosphate peak that eluted at ~6.77 minutes. The fractions were combined and pumped down from methanol
- 20 to remove buffer salt to afford 17 mg of product.

Screening for Novel Enzymatic nucleic acid molecule Motifs Using Modified NTPs (Class I Motif)

- Our initial pool contained 3×10^{14} individual sequences of 2'-amino-dCTP/2'-amino-dUTP RNA. We optimized transcription conditions in order to increase the amount
- 25 of RNA product by inclusion of methanol and lithium chloride. 2'-amino-2'-deoxynucleotides do not interfere with the reverse transcription and amplification steps of selection and confer nuclease resistance. We designed the pool to have two binding arms complementary to the substrate, separated by the random 40 nucleotide region. The 16-mer substrate had two domains, 5 and 10 nucleotides long, that bind the pool, separated by
- 30 an unpaired guanosine. On the 5' end of the substrate was a biotin attached by a C18 linker. This enabled us to link the substrate to a NeutrAvidin™ resin in a column format.

The desired reaction would be cleavage at the unpaired G upon addition of magnesium cofactor followed by dissociation from the column due to instability of the 5 base pair helix. A detailed protocol follows:

- Enzymatic nucleic acid molecule Pool Prep: The initial pool DNA was prepared by
- 5 converting the following template oligonucleotides into double-stranded DNA by filling in with taq polymerase. (template=5'-ACC CTC ACT AAA GGC CGT (N)₄₀ GGT TGC ACA CCT TTC-3'; primer 1=5'-CAC TTA GCA TTA ACC CTC ACT AAA GGC CGT-3'; primer 2=5'-TAA TAC GAC TCA CTA TAG GAA AGG TGT GCA ACC-3'.)
- All DNA oligonucleotides were synthesized by Operon technologies. Template oligos
- 10 were purified by denaturing PAGE and Sep-pak chromatography columns (Waters). RNA substrate oligos were using standard solid phase chemistry and purified by denaturing PAGE followed by ethanol precipitation. Substrates for *in vitro* cleavage assays were 5'-end labeled with gamma-³²P-ATP and T4 polynucleotide kinase followed by denaturing PAGE purification and ethanol precipitation.
- 15 5 nmole of template, 10 nmole of each primer and 250 U taq polymerase were incubated in a 10 ml volume with 1X PCR buffer (10 mM tris-HCl (pH 8.3), 1.5 mM MgCl₂, 50 mM KCl) and 0.2 mM each dNTP as follows: 94°C, 4 minutes; (94°C, 1 min; 42°C, 1 min; 72°C, 2 min) through four cycles; and then 72°C, for 10 minutes. The product was analyzed on 2% Separide™ agarose gel for size and then was extracted twice
- 20 with buffered phenol, then chloroform-isoamyl alcohol, and ethanol precipitated. The initial RNA pool was made by transcription of 500 pmole (3 x 10¹⁴ molecules) of this DNA as follows. Template DNA was added to 40 mM tris-HCl (pH 8.0), 12 mM MgCl₂, 5 mM dithiothreitol (DTT), 1 mM spermidine, 0.002% triton X-100, 1 mM LiCl, 4% PEG-8000, 10% methanol, 2 mM ATP, 2 mM GTP, 2 mM 2'-amino-dCTP, 2 mM 2'-amino-dUTP, 5 U/ml inorganic pyrophosphatase, and 5 U/μl T7 RNA polymerase at room
- 25 temperature for a total volume of 1 ml. A separate reaction contained a trace amount of alpha-³²P-GTP for detection. Transcriptions were incubated at 37°C for 2 hours followed by addition of equal volume STOP buffer (94% formamide, 20 mM EDTA, 0.05% bromophenol blue). The resulting RNA was purified by 6% denaturing PAGE gel, Sep-
- 30 pak™ chromatography, and ethanol precipitated.

INITIAL SELECTION: 2 nmole of 16 mer 5'-biotinylated substrate (5'-biotin-C18 linker-GCC GUG GGU UGC ACA C-3') was linked to 200 μl UltraLink Immobilized

- NeutrAvidin™ resin (400 µl slurry, Pierce) in binding buffer (20 mM NaPO₄ (pH 7.5), 150 mM NaCl) for 30 minutes at room temperature. The resulting substrate column was washed with 2 ml binding buffer followed by 2 ml column buffer (50 mM tris-HCl (pH 8.5), 100 mM NaCl, 50 mM KCl). The flow was capped off and 1000 pmole of initial
- 5 pool RNA in 200 µl column buffer was added to the column and incubated 30 minutes at room temperature. The column was uncapped and washed with 2 ml column buffer, then capped off. 200 µl elution buffer (=column buffer + 25 mM MgCl₂) was added to the column and allowed to incubate 30 minutes at room temperature. The column was uncapped and eluent collected followed by three 200 µl elution buffer washes. The
- 10 eluent/washes were ethanol precipitated using glycogen as carrier and rehydrated in 50 µl sterile H₂O. The eluted RNA was amplified by standard reverse transcription/PCR amplification techniques. 5-31 µl RNA was incubated with 20 pmol of primer 1 in 14 µl volume 90° for 3 min then placed on ice for 1 minute. The following reagent were added (final concentrations noted): 1X PCR buffer, 1 mM each dNTP, 2 U/µl RNase Inhibitor,
- 15 10 U/µl SuperScript™ II reverse transcriptase. The reaction was incubated 42° for 1 hour followed by 95° for 5 min in order to inactivate the reverse transcriptase. The volume was then increased to 100 µl by adding water and reagents for PCR: 1X PCR buffer, 20 pmol primer 2, and 2.5 U taq DNA polymerase. The reaction was cycled in a Hybaid thermocycler: 94°, 4 min; (94°C, 30 sec; 54°C, 30 sec; 72°C, 1 min) X 25; 72°C, 5 min.
- 20 Products were analyzed on agarose gel for size and ethanol precipitated. One-third to one-fifth of the PCR DNA was used to transcribe the next generation, in 100 µl volume, as described above. Subsequent rounds used 20 pmol RNA for the column with 40 pmol substrate.

- TWO COLUMN SELECTION:* At generation 8 (G8), the column selection was
- 25 changed to the two column format. 200 pmoles of 22 mer 5'-biotinylated substrate (5'-biotin-C18 linker-GCC GUG GGU UGC ACA CCU UUC C-C18 linker-thiol modifier C6 S-S-inverted abasic-3') was used in the selection column as described above. Elution was in 200 µl elution buffer followed by a 1 ml elution buffer wash. The 1200 µl eluent was passed through a product trap column by gravity. The product trap column was prepared
- 30 as follows: 200 pmol 16 mer 5'-biotinylated "product" (5'-GGU UGC ACA CCU UUC C-C18 linker-biotin-3') was linked to the column as described above and the column was equilibrated in elution buffer. Eluent from the product column was precipitated as

previously described. The products were amplified as above only with 2.5-fold more volume and 100 pmol each primer. 100 μ l of the PCR reaction was used to do a cycle course; the remaining fraction was amplified the minimal number of cycles needed for product. After 3 rounds (G11), there was visible activity in a single turnover cleavage assay. By generation 13, 45% of the substrate was cleaved at 4 hours; k_{obs} of the pool was 0.037 min^{-1} in 25 mM MgCl_2 . We subcloned and sequenced generation 13; the pool was still very diverse. Since our goal was an enzymatic nucleic acid molecule that would work in a physiological environment, we decided to change selection pressure rather than exhaustively catalog G13.

Reselection of the N40 pool was started from G12 DNA. Part of the G12 DNA was subjected to hypermutagenic PCR (Vartanian *et al.*, 1996, *Nucleic Acids Research* 24, 2627-2631) to introduce a 10% per position mutation frequency and was designated N40H. At round 19, part of the DNA was hypermutagenized again, giving N40M and N40HM (a total of 4 parallel pools). The column substrates remained the same; buffers were changed and temperature of binding and elution was raised to 37°C. Column buffer was replaced by physiological buffer (50 mM tris-HCl (pH 7.5), 140 mM KCl, 10 mM NaCl) and elution buffer was replaced by 1 mM Mg buffer (physiological buffer + 1 mM MgCl_2). Amount of time allowed for the pool to bind the column was eventually reduced to 10 min and elution time was gradually reduced from 30 min to 20 sec. Between rounds 18 and 23, k_{obs} for the N40 pool stayed relatively constant at 0.035-0.04 min^{-1} . Generation 22 from each of the 4 pools was cloned and sequenced.

CLONING AND SEQUENCING: Generations 13 and 22 were cloned using Novagen's Perfectly Blunt™ Cloning kit (pT7Blue-3 vector) following the kit protocol. Clones were screened for insert by PCR amplification using vector-specific primers. Positive clones were sequenced using ABI Prism 7700 sequence detection system and vector-specific primer. Sequences were aligned using MacVector software; two-dimensional folding was performed using Mulfold software (Zuker, 1989, *Science* 244, 48-52; Jaeger *et al.*, 1989, *Biochemistry* 86, 7706-7710; Jaeger *et al.*, 1989, R. F. Doolittle ed., *Methods in Enzymology*, 183, 281-306). Individual clone transcription units were constructed by PCR amplification with 50 pmol each primer 1 and primer 2 in 1X PCR buffer, 0.2 mM each dNTP, and 2.5 U of taq polymerase in 100 μ l volume cycled as follows: 94°C, 4 min; (94°C, 30 sec; 54°C, 30 sec; 72°C, 1 min) X 20; 72°C, 5 min.

Transcription units were ethanol precipitated, rehydrated in 30 μ l H₂O, and 10 μ l was transcribed in 100 μ l volume and purified as previously described.

Thirty-six clones from each pool were sequenced and were found to be variations of the same consensus motif. Unique clones were assayed for activity in 1 mM MgCl₂ and physiological conditions; nine clones represented the consensus sequence and were used in subsequent experiments. There were no mutations that significantly increased activity; most of the mutations were in regions believed to be duplex, based on the proposed secondary structure. In order to make the motif shorter, we deleted the 3'-terminal 25 nucleotides necessary to bind the primer for amplification. The measured rates of the full length and truncated molecules were both 0.04 min⁻¹; thus we were able to reduce the size of the motif from 86 to 61 nucleotides. The molecule was shortened even further by truncating base pairs in the stem loop structures as well as the substrate recognition arms to yield a 48 nucleotide molecule. In addition, many of the ribonucleotides were replaced with 2-*O*-methyl modified nucleotides to stabilize the molecule. An example of the new motif is given in Figure 13. Those of ordinary skill in the art will recognize that the molecule is not limited to the chemical modifications shown in the figure and that it represents only one possible chemically modified molecule.

Kinetic Analysis:

Single turnover kinetics were performed with trace amounts of 5'-³²P-labeled substrate and 10-1000 nM pool of enzymatic nucleic acid molecule. 2X substrate in 1X buffer and 2X pool/enzymatic nucleic acid molecule in 1X buffer were incubated separately 90° for 3 min followed by equilibration to 37° for 3 min. Equal volume of 2X substrate was added to pool/enzymatic nucleic acid molecule at t₀ and the reaction was incubated at 37°C. Time points were quenched in 1.2 vol STOP buffer on ice. Samples were heated to 90°C for 3 min prior to separation on 15% sequencing gels. Gels were imaged using a PhosphorImager and quantitated using ImageQuant™ software (Molecular Dynamics). Curves were fit to double-exponential decay in most cases, although some of the curves required linear fits.

STABILITY: Serum stability assays were performed as previously described (Beigelman *et al.*, 1995, *J. Biol. Chem.* 270, 25702-25708). 1 μ g of 5'-³²P-labeled

synthetic enzymatic nucleic acid molecule was added to 13 μ l cold and assayed for decay in human serum. Gels and quantitation were as described in kinetics section.

SUBSTRATE REQUIREMENTS: Table 60 outlines the substrate requirements for Class I motif. Substrates maintained Watson-Crick or wobble base pairing with mutant Class I constructs. Activity in single turnover kinetic assay is shown relative to wild type Class I and 22 mer substrate (50 mM Tris-HCL (pH 7.5), 140 mM KCl, 10 mM NaCl, 1 mM $MgCl_2$, 100 nM ribozyme, 5 nM substrate, 37°C).

RANDOM REGION MUTATION ALIGNMENT: Table 61 outlines the random region alignment of 134 clones from generation 22 (1.x = N40, 2.x = N40M, 3.x = N40H, 4.x = N40HM). The number of copies of each mutant is in parenthesis in the table, deviations from consensus are shown. Mutations that maintain base pair U19:A34 are shown in *italic*. Activity in single turnover kinetic assay is shown relative to the G22 pool rate (50 mM Tris-HCL pH 7.5, 140 mM KCl, 10 mM NaCl, 1 mM $MgCl_2$, 100 nM ribozyme, trace substrate, 37°C).

STEM TRUNCATION AND LOOP REPLACEMENT ANALYSIS: Figure 25 shows a representation of Class I ribozyme stem truncation and loop replacement analysis. The K_{rel} is compared to a 61 mer Class I ribozyme measured as described above. Figure 26 shows examples of Class I ribozymes with truncated stem(s) and/or non-nucleotide linker replaced loop structures.

Inhibition of HCV Using Class I (Amberzyme) Motif

During HCV infection, viral RNA is present as a potential target for enzymatic nucleic acid molecule cleavage at several processes: uncoating, translation, RNA replication and packaging. Target RNA may be more or less accessible to enzymatic nucleic acid molecule cleavage at any one of these steps. Although the association between the HCV initial ribosome entry site (IRES) and the translation apparatus is mimicked in the HCV 5'UTR/luciferase reporter system, these other viral processes are not represented in the OST7 system. The resulting RNA/protein complexes associated with the target viral RNA are also absent. Moreover, these processes may be coupled in an HCV-infected cell which could further impact target RNA accessibility. Therefore, we

tested whether enzymatic nucleic acid molecules designed to cleave the HCV 5'UTR could effect a replicating viral system.

Recently, Lu and Wimmer characterized an HCV-poliovirus chimera in which the poliovirus IRES was replaced by the IRES from HCV (Lu & Wimmer, 1996, *Proc. Natl. Acad. Sci. USA.* 93, 1412-1417). Poliovirus (PV) is a positive strand RNA virus like HCV, but unlike HCV is non-enveloped and replicates efficiently in cell culture. The HCV-PV chimera expresses a stable, small plaque phenotype relative to wild type PV.

The capability of the new enzymatic nucleic acid molecule motifs to inhibit HCV RNA intracellularly was tested using a dual reporter system that utilizes both firefly and Renilla luciferase (**Figure 14**). A number of enzymatic nucleic acid molecules having the new class I motif (Amberzyme) were designed and tested (**Table 56**). The Amberzyme ribozymes were targeted to the 5' HCV UTR region, which when cleaved, would prevent the translation of the transcript into luciferase. OST-7 cells were plated at 12,500 cells per well in black walled 96-well plates (Packard) in medium DMEM containing 10% fetal bovine serum, 1% pen/strep, and 1% L-glutamine and incubated at 37°C overnight. A plasmid containing T7 promoter expressing 5' HCV UTR and firefly luciferase (T7C1-341 (Wang *et al.*, 1993, *J. of Virol.* 67, 3338-3344)) was mixed with a pRLSV40 Renilla control plasmid (Promega Corporation) followed by enzymatic nucleic acid molecule, and cationic lipid to make a 5X concentration of the reagents (T7C1-341 (4 µg/ml), pRLSV40 renilla luciferase control (6 µg/ml), enzymatic nucleic acid molecule (250 nM), transfection reagent (28.5 µg/ml).

The complex mixture was incubated at 37°C for 20 minutes. The media was removed from the cells and 120 µl of Opti-mem media was added to the well followed by 30 µl of the 5X complex mixture. 150 µl of Opti-mem was added to the wells holding the untreated cells. The complex mixture was incubated on OST-7 cells for 4 hours, lysed with passive lysis buffer (Promega Corporation) and luminescent signals were quantified using the Dual Luciferase Assay Kit using the manufacturer's protocol (Promega Corporation). The data shown in **Figure 15** is a dose curve of enzymatic nucleic acid molecule targeting site 146 of the HCV RNA and is presented as a ratio between the firefly and Renilla luciferase fluorescence. The enzymatic nucleic acid molecule was able to reduce the quantity of HCV RNA at all enzymatic nucleic acid molecule concentrations

yielding an IC_{50} of approximately 5 nM. Other sites were also efficacious (**Figure 16**), in particular enzymatic nucleic acid molecules targeting sites 133, 209, and 273 were also able to reduce HCV RNA compared to the irrelevant (IRR) controls.

5 Cleavage of Substrates Using Completely Modified class I (Amberzyme) enzymatic nucleic acid molecule

- The ability of an enzymatic nucleic acid, which is modified at every 2' position to cleave a target RNA was tested to determine if any ribonucleotide positions are necessary in the Amberzyme motif. Enzymatic nucleic acid molecules were constructed with 2'-O-methyl, and 2'-amino (NH_2) nucleotides and included no ribonucleotides (**Table 56**; gene name: no ribo) and kinetic analysis was performed as described in example 13. 100 nM enzymatic nucleic acid was mixed with trace amounts of substrate in the presence of 1 mM $MgCl_2$ at physiological conditions (37°C). The Amberzyme with no ribonucleotide present in it has a K_{rel} of 0.13 compared to the enzymatic nucleic acid with a few ribonucleotides present in the molecule shown in **Table 56** (ribo). This shows that Amberzyme enzymatic nucleic acid molecule may not require the presence of 2'-OH groups within the molecule for activity.
- 10
- 15

Substrate Recognition Rules for Class II (zinzyme) enzymatic nucleic acid molecules

- Class II (zinzyme) ribozymes were tested for their ability to cleave base-paired substrates with all sixteen possible combinations of bases immediately 5' and 3' proximal to the bulged cleavage site G. Ribozymes were identical in all remaining positions of their 7 base pair binding arms. Activity was assessed at two and twenty-four hour time points under standard reaction conditions [20 mM HEPES pH 7.4, 140 mM KCl, 10 mM NaCl, 1 mM MgCl₂, 1 mM CaCl₂ - 37° C]. **Figure 19** shows the results of this study. Base paired substrate UGG (not shown in the figure) cleaved as poorly as CGG shown in the figure. The figure shows the cleavage site substrate triplet in the 5'- 3' direction and 2 and 24 hour time points are shown top to bottom respectively. The results indicate the cleavage site triplet is most active with a 5'- Y-G-H -3' (where Y is C or U and H is A, C or U with cleavage between G and H); however, activity is detected particularly with the 24 hour time point for most paired substrates. All positions outside of the cleavage triplet were found to tolerate any base pairings (data not shown).
- All possible mispairs immediately 5' and 3' proximal to the bulged cleavage site G were tested to a class II ribozyme designed to cleave a 5'-C-G-C -3'. It was observed the 5' and 3' proximal sites are as active with G:U wobble pairs, in addition, the 5' proximal site will tolerate a mismatch with only a slight reduction in activity [data not shown].

20 Screening for Novel Enzymatic nucleic acid molecule Motifs (Class II Motifs)

- The selections were initiated with pools of $> 10^{14}$ modified RNA's of the following sequence: 5'-GGGAGGAGGAAGUGCCU (N)₁₅ UGCCGCGCUCGCUCCAGUCC-3'. The RNA was enzymatically generated using the mutant T7 Y639F RNA polymerase prepared by Rui Souza. The following modified NTP's were incorporated: 2'-deoxy-2'-fluoro-adenine triphosphate, 2'-deoxy-2'-fluoro-uridine triphosphate or 2'-deoxy-2'-fluoro-5-[(N-imidazole-4acetyl)propyl amine] uridine triphosphate, and 2'-deoxy-2'-amino-cytidine triphosphate; natural guanine triphosphate was used in all selections so that alpha -³²P-GTP could be used to label pool RNA's. RNA pools were purified by denaturing gel electrophoresis 8% polyacrilamide 7 M Urea.
- The following target RNA (resin A) was synthesized and coupled to Iodoacetyl Ultralink™ resin (Pierce) by the supplier's procedure: 5'-b-L-GGACUGGGAGCGAGCGCGCGCAGGCACU GAAG-L-S-B-3'; where b is biotin (Glenn

Research cat# 10-1953-nn), L is polyethylene glycol spacer (Glenn Research cat# 10-1918-nn), S is thiol-modifier C6 S-S (Glenn Research cat# 10-1936-nn), B is a standard inverted deoxy abasic.

RNA pools were added to 100 μ l of 5 μ M Resin A in the buffer A (20 mM HEPES pH 7.4, 140 mM KCL, 10 mM NaCl) and incubated at 22⁰C for 5 minutes. The temperature was then raised to 37⁰C for 10 minutes. The resin was washed with 5 ml buffer A. Reaction was triggered by the addition of buffer B(20 mM HEPES pH 7.4, 140 mM KCL, 10 mM NaCl, 1 mM MgCl₂, 1 mM CaCl₂). Incubation proceeded for 20 minutes in the first generation and was reduced progressively to 1 minute in the final generations; with 13 total generations. The reaction eluent was collected in 5 M NaCl to give a final concentration of 2 M NaCl. To this was added 100 μ l of 50% slurry Ultralink NeutraAvidin™ (Pierce). Binding of cleaved biotin product to the avidin resin was allowed by 20 minute incubation at 22⁰ C. The resin was subsequently washed with 5 ml of 20 mM HEPES pH 7.4, 2 M NaCl. Desired RNA's were removed by a 1.2 ml denaturing wash 1M NaCl, 10 M Urea at 94⁰ C over 10 minutes. RNA's were double precipitated in 0.3 M sodium acetate to remove Cl⁻ ions inhibitory to reverse transcription. Standard protocols of reverse transcription and PCR amplification were performed. RNA's were again transcribed with the modified NTP's described above. After 13 generations cloning and sequencing provided 14 sequences which were able to cleave the target substrate. Six sequences were characterized to determine secondary structure and kinetic cleavage rates. The structures and kinetic data are given in Figure 17. The sequences of eight other enzymatic nucleic acid molecule sequences are given in Table 57. The size, sequence, and chemical compositions of these molecules can be modified as described below or using other techniques well known in the art.

Nucleic Acid Catalyst Engineering

Sequence, chemical and structural variants of Class I and Class II enzymatic nucleic acid molecule can be engineered and re-engineered using the techniques shown in this application and known in the art. For example, the size of class I and class II enzymatic nucleic acid molecules can, be reduced or increased using the techniques known in the art (Zaug *et al.*, 1986, *Nature*, 324, 429; Ruffner *et al.*, 1990, *Biochem.*, 29, 10695; Beaudry *et*

- al.*, 1990, *Biochem.*, 29, 6534; McCall *et al.*, 1992, *Proc. Natl. Acad. Sci., USA.*, 89, 5710; Long *et al.*, 1994, *supra*; Hendry *et al.*, 1994, *BBA* 1219, 405; Benseler *et al.*, 1993, *JACS*, 115, 8483; Thompson *et al.*, 1996, *Nucl. Acids Res.*, 24, 4401; Michels *et al.*, 1995, *Biochem.*, 34, 2965; Been *et al.*, 1992, *Biochem.*, 31, 11843; Guo *et al.*, 1995, *EMBO. J.*, 14, 368; Pan *et al.*, 1994, *Biochem.*, 33, 9561; Cech, 1992, *Curr. Op. Struc. Bio.*, 2, 605; Sugiyama *et al.*, 1996, *FEBS Lett.*, 392, 215; Beigelman *et al.*, 1994, *Bioorg. Med. Chem.*, 4, 1715; Santoro *et al.*, 1997, *PNAS* 94, 4262; all are incorporated in their totality by reference herein), to the extent that the overall catalytic activity of the ribozyme is not significantly decreased.
- 10 Further rounds of *in vitro* selection strategies described herein and variations thereof can be readily used by a person skilled in the art to evolve additional nucleic acid catalysts and such new catalysts are within the scope of the instant invention.

Example 16: Activity of Class II (zinzyme) nucleic acid catalysts to inhibit HER2 gene expression

- 15 Applicant has designed, synthesized and tested several class II (zinzyme) ribozymes targeted against HER2 RNA (see, for example, **Tables 58, 59, and 62**) in cell proliferation RNA reduction assays.
- Proliferation assay:
- 20 The model proliferation assay used in the study can require a cell-plating density of 2000-10000 cells/well in 96-well plates and at least 2 cell doublings over a 5-day treatment period. Cells used in proliferation studies were either human breast or ovarian cancer cells (SKBR-3 and SKOV-3 cells respectively). To calculate cell density for proliferation assays, the FIPS (fluoro-imaging processing system) method well known in the art was
- 25 used. This method allows for cell density measurements after nucleic acids are stained with CyQuant® dye, and has the advantage of accurately measuring cell densities over a very wide range 1,000-100,000 cells/well in 96-well format.
- Ribozymes (50-200 nM) were delivered in the presence of cationic lipid at 2.0-5.0 µg/mL and inhibition of proliferation was determined on day 5 post-treatment. Two full
- 30 ribozyme screens were completed resulting in the selection of 14 ribozymes. Class II (zinzyme) ribozymes against sites, 314 (RPI No. 18653), 443 (RPI No. 18680), 597 (RPI

No. 18697), 659 (RPI No. 18682), 878 (RPI Nos. 18683 and 18654), 881 (RPI Nos. 18684 and 18685) 934 (RPI No. 18651), 972 (RPI No. 18656, 19292, 19727, 19728, and 19293), 1292 (RPI No. 18726), 1541 (RPI No. 18687), 2116 (RPI No. 18729), 2932 (RPI No. 18678), 2540 (RPI No. 18715), and 3504 (RPI No. 18710) caused inhibition of

proliferation ranging from 25-80% as compared to a scrambled control ribozyme. An example of results from a cell culture assay is shown in **Figure 20**. Referring to **Figure 20**, Class II ribozymes targeted against HER2 RNA are shown to cause significant inhibition of proliferation of cells. This shows that ribozymes, for instance the Class II (zinzyme) ribozymes are capable of inhibiting HER2 gene expression in mammalian cells.

RNA assay:

RNA was harvested 24 hours post-treatment using the Qiagen RNeasy® 96 procedure. Real time RT-PCR (TaqMan® assay) was performed on purified RNA samples using separate primer/probe sets specific for either target HER2 RNA or control actin RNA (to normalize for differences due to cell plating or sample recovery). Results are shown as the average of triplicate determinations of HER2 to actin RNA levels post-treatment. **Figure 30** shows class II ribozyme (zinzyme) mediated reduction in HER2 RNA targeting site 972 vs a scrambled attenuated control.

Dose response assays:

Active ribozyme was mixed with binding arm-attenuated control (BAC) ribozyme to a final oligonucleotide concentration of either 100, 200 or 400 nM and delivered to cells in the presence of cationic lipid at 5.0 µg/mL. Mixing active and BAC in this manner maintains the lipid to ribozyme charge ratio throughout the dose response curve. HER2 RNA reduction was measured 24 hours post-treatment and inhibition of proliferation was determined on day 5 post-treatment. The dose response antiproliferation results are summarized in **Figure 31** and the dose-dependent reduction of HER2 RNA results are summarized in **Figure 32**. **Figure 33** shows a combined dose response plot of both anti-proliferation and RNA reduction data for a class II ribozyme targeting site 972 of HER2 RNA (RPI 19293).

Example 17: Reduction of ribose residues in Class II (zinzyme) nucleic acid catalysts

Class II (zinzyme) nucleic acid catalysts were tested for their activity as a function ribonucleotide content. A Zinzyme having no ribonucleotide residue (*ie.*, no 2'-OH group at the 2' position of the nucleotide sugar) against the K-Ras site 521 was designed. This molecules were tested utilizing the chemistry shown in **Figure 27a**. The *in vitro* catalytic activity zinzyme construct was not significantly effected (the cleavage rate reduced only 10 fold).

The Kras zinzyme shown in **Figure 27a** was tested in physiological buffer with the divalent concentrations as indicated in the legend (high NaCl is an altered monovalent condition shown) of **Figure 28**. The 1 mM Ca^{++} condition yielded a rate of 0.005 min^{-1} while the 1 mM Mg^{++} condition yielded a rate of 0.002 min^{-1} . The ribose containing wild type yields a rate of 0.05 min^{-1} while substrate in the absence of zinzyme demonstrates less than 2% degradation at the longest time point under reaction conditions shown. This illustrates a well-behaved cleavage reaction done by a non-ribose containing catalyst with only a 10-fold reduced cleavage as compared to ribonucleotide-containing zinzyme and vastly above non-catalyzed degradation.

A more detailed investigation into the role of ribose positions in the Class II (zinzyme) motif was carried out in the context of the HER2 site 972 (Applicant has further designed a fully modified Zinzyme as shown in **Figure 27b** targeting the HER2 RNA site 972). **Figure 29** is a diagram of the alternate formats tested and their relative rates of catalysis. The effect of substitution of ribose G for the 2'-O-methyl C-2'-O-methyl A in the loop of Zinzyme (see **Figure 34**) was insignificant when assayed with the Kras target but showed a modest rate enhancement in the HER2 assays. The activity of all Zinzyme motifs, including the fully stabilized "O ribose" (RPI 19727) are well above background noise level degradation. Zinzyme with only two ribose positions (RPI 19293) are sufficient to restore "wild-type" activity. Motifs containing 3 (RPI 19729), 4 (RPI 19730) or 5 ribose (RPI 19731) positions demonstrated a greater extent of cleavage and profiles almost identical to the 2 ribose motif. Applicant has thus demonstrated that a Zinzyme with no ribonucleotides present at any position can catalyze efficient RNA cleavage activity. Thus, Zinzyme enzymatic nucleic acid molecules do not require the presence of 2'-OH group within the molecule for catalytic activity.

Example 18: Activity of reduced ribose containing Class II (zinczyme) nucleic acid catalysts to inhibit HER2 gene expression

A cell proliferation assay for testing reduced ribo class II (zinczyme) nucleic acid catalysts (50-400 nM) targeting HER2 site 972 was performed as described in example 19.

- 5 The results of this study are summarized in **Figure 35**. These results indicate significant inhibition of HER2 gene expression using stabilized Class II (zinczyme) motifs, including two ribo (RPI 19293), one ribo (RPI 19728), and non-ribo (RPI 19727) containing nucleic acid catalysts.

10 Applications

The use of NTP's described in this invention have several research and commercial applications. These modified nucleotide triphosphates can be used for *in vitro* selection (evolution) of oligonucleotides with novel functions. Examples of *in vitro* selection protocols are incorporated herein by reference (Joyce, 1989, *Gene*, 82, 83-87; Beaudry *et al.*, 1992, *Science* 257, 635-641; Joyce, 1992, *Scientific American* 267, 90-97; Breaker *et al.*, 1994, *TIBTECH* 12, 268; Bartel *et al.*, 1993, *Science* 261:1411-1418; Szostak, 1993, *TIBS* 17, 89-93; Kumar *et al.*, 1995, *FASEB J.*, 9, 1183; Breaker, 1996, *Curr. Opin. Biotech.*, 7, 442).

- 15 Additionally, these modified nucleotide triphosphates can be employed to generate modified oligonucleotide combinatorial chemistry libraries. Several references for this technology exist (Brenner *et al.*, 1992, *PNAS* 89, 5381-5383; Eaton, 1997, *Curr. Opin. Chem. Biol.* 1, 10-16), which are all incorporated herein by reference.

Diagnostic uses

- 25 Enzymatic nucleic acid molecules of this invention may be used as diagnostic tools to examine genetic drift and mutations within diseased cells or to detect the presence of specific RNA in a cell. The close relationship between enzymatic nucleic acid molecule activity and the structure of the target RNA allows the detection of mutations in any region of the molecule which alters the base-pairing and three-dimensional structure of the target
- 30 RNA. By using multiple enzymatic nucleic acid molecules described in this invention, one may map nucleotide changes which are important to RNA structure and function *in vitro*, as well as in cells and tissues. Cleavage of target RNAs with enzymatic nucleic acid

molecules may be used to inhibit gene expression and define the role (essentially) of specified gene products in the progression of disease. In this manner, other genetic targets may be defined as important mediators of the disease. These experiments will lead to better treatment of the disease progression by affording the possibility of combinational therapies (e.g., multiple enzymatic nucleic acid molecules targeted to different genes, enzymatic nucleic acid molecules coupled with known small molecule inhibitors, radiation or intermittent treatment with combinations of enzymatic nucleic acid molecules and/or other chemical or biological molecules). Other *in vitro* uses of enzymatic nucleic acid molecules of this invention are well known in the art, and include detection of the presence of mRNAs associated with related conditions. Such RNA is detected by determining the presence of a cleavage product after treatment with a enzymatic nucleic acid molecule using standard methodology.

In a specific example, enzymatic nucleic acid molecules which can cleave only wild-type or mutant forms of the target RNA are used for the assay. The first enzymatic nucleic acid molecule is used to identify wild-type RNA present in the sample and the second enzymatic nucleic acid molecule will be used to identify mutant RNA in the sample. As reaction controls, synthetic substrates of both wild-type and mutant RNA will be cleaved by both enzymatic nucleic acid molecules to demonstrate the relative enzymatic nucleic acid molecule efficiencies in the reactions and the absence of cleavage of the "non-targeted" RNA species. The cleavage products from the synthetic substrates will also serve to generate size markers for the analysis of wild type and mutant RNAs in the sample population. Thus each analysis can involve two enzymatic nucleic acid molecules, two substrates and one unknown sample which can be combined into six reactions. The presence of cleavage products can be determined using an RNase protection assay so that full-length and cleavage fragments of each RNA can be analyzed in one lane of a polyacrylamide gel. It is not absolutely required to quantify the results to gain insight into the expression of mutant RNAs and putative risk of the desired phenotypic changes in target cells. The expression of mRNA whose protein product is implicated in the development of the phenotype is adequate to establish risk. If probes of comparable specific activity are used for both transcripts, then a qualitative comparison of RNA levels will be adequate and will decrease the cost of the initial diagnosis. Higher mutant form to

wild-type ratios will be correlated with higher risk whether RNA levels are compared qualitatively or quantitatively.

Additional Uses

- 5 Potential usefulness of sequence-specific enzymatic nucleic acid molecules of the instant invention can have many of the same applications for the study of RNA that DNA restriction endonucleases have for the study of DNA (Nathans *et al.*, 1975 *Ann. Rev. Biochem.* 44:273). For example, the pattern of restriction fragments can be used to establish sequence relationships between two related RNAs, and large RNAs could be
- 10 specifically cleaved to fragments of a size more useful for study. The ability to engineer sequence specificity of the enzymatic nucleic acid molecule is ideal for cleavage of RNAs of unknown sequence. Applicant describes the use of nucleic acid molecules to down-regulate gene expression of target genes in bacterial, microbial, fungal, viral, and eukaryotic systems including plant, or mammalian cells.
- 15 All patents and publications mentioned in the specification are indicative of the levels of skill of those skilled in the art to which the invention pertains. All references cited in this disclosure are incorporated by reference to the same extent as if each reference had been incorporated by reference in its entirety individually.
- 20 One skilled in the art would readily appreciate that the present invention is well adapted to carry out the objects and obtain the ends and advantages mentioned, as well as those inherent therein. The methods and compositions described herein as presently representative of preferred embodiments are exemplary and are not intended as limitations on the scope of the invention. Changes therein and other uses will occur to those skilled in the art, which are encompassed within the spirit of the invention, are defined by the scope
- 25 of the claims.
- It will be readily apparent to one skilled in the art that varying substitutions and modifications may be made to the invention disclosed herein without departing from the scope and spirit of the invention. Thus, such additional embodiments are within the scope of the present invention and the following claims.
- 30 The invention illustratively described herein suitably may be practiced in the absence of any element or elements, limitation or limitations which is not specifically disclosed herein. Thus, for example, in each instance herein any of the terms "comprising",

“consisting essentially of” and “consisting of” may be replaced with either of the other two terms. The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention that in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments, optional features, modification and variation of the concepts herein disclosed may be resorted to by those skilled in the art, and that such modifications and variations are considered to be within the scope of this invention as defined by the description and the appended claims.

In addition, where features or aspects of the invention are described in terms of Markush groups or other grouping of alternatives, those skilled in the art will recognize that the invention is also thereby described in terms of any individual member or subgroup of members of the Markush group or other group.

Thus, additional embodiments are within the scope of the invention and within the following claims

Table 1

TABLE 1

Characteristics of naturally occurring ribozymes

Group I Introns

- Size: ~150 to >1000 nucleotides.
- Requires a U in the target sequence immediately 5' of the cleavage site.
- Binds 4-6 nucleotides at the 5'-side of the cleavage site.
- Reaction mechanism: attack by the 3'-OH of guanosine to generate cleavage products with 3'-OH and 5'-guanosine.
- Additional protein cofactors required in some cases to help folding and maintenance of the active structure.
- Over 300 known members of this class. Found as an intervening sequence in *Tetrahymena thermophila* rRNA, fungal mitochondria, chloroplasts, phage T4, blue-green algae, and others.
- Major structural features largely established through phylogenetic comparisons, mutagenesis, and biochemical studies [i,ii].
- Complete kinetic framework established for one ribozyme [iii,iv,v,vi].
- Studies of ribozyme folding and substrate docking underway [vii,viii,ix].
- Chemical modification investigation of important residues well established [x,xi].
- The small (4-6 nt) binding site may make this ribozyme too non-specific for targeted RNA cleavage, however, the *Tetrahymena* group I intron has been used to repair a "defective" β -galactosidase message by the ligation of new β -galactosidase sequences onto the defective message [xii].

RNase P RNA (M1 RNA)

- Size: ~290 to 400 nucleotides.
- RNA portion of a ubiquitous ribonucleoprotein enzyme.
- Cleaves tRNA precursors to form mature tRNA [xiii].
- Reaction mechanism: possible attack by M^{2+} -OH to generate cleavage products with 3'-OH and 5'-phosphate.
- RNase P is found throughout the prokaryotes and eukaryotes. The RNA subunit has been sequenced from bacteria, yeast, rodents, and primates.
- Recruitment of endogenous RNase P for therapeutic applications is possible through hybridization of an External Guide Sequence (EGS) to the target RNA [xiv,xv]
- Important phosphate and 2' OH contacts recently identified [xvi,xvii]

Group II Introns

- Size: >1000 nucleotides.
- Trans cleavage of target RNAs recently demonstrated [xviii,xix].

Table 1

- Sequence requirements not fully determined.
- Reaction mechanism: 2'-OH of an internal adenosine generates cleavage products with 3'-OH and a "lariat" RNA containing a 3'-5' and a 2'-5' branch point.
- Only natural ribozyme with demonstrated participation in DNA cleavage [xx,xxi] in addition to RNA cleavage and ligation.
- Major structural features largely established through phylogenetic comparisons [xxii].
- Important 2' OH contacts beginning to be identified [xxiii]
- Kinetic framework under development [xxiv]

Neurospora VS RNA

- Size: ~144 nucleotides.
- Trans cleavage of hairpin target RNAs recently demonstrated [xxv].
- Sequence requirements not fully determined.
- Reaction mechanism: attack by 2'-OH 5' to the scissile bond to generate cleavage products with 2',3'-cyclic phosphate and 5'-OH ends.
- Binding sites and structural requirements not fully determined.
- Only 1 known member of this class. Found in *Neurospora* VS RNA.

Hammerhead Ribozyme

(see text for references)

- Size: ~13 to 40 nucleotides.
- Requires the target sequence UH immediately 5' of the cleavage site.
- Binds a variable number nucleotides on both sides of the cleavage site.
- Reaction mechanism: attack by 2'-OH 5' to the scissile bond to generate cleavage products with 2',3'-cyclic phosphate and 5'-OH ends.
- 14 known members of this class. Found in a number of plant pathogens (virusoids) that use RNA as the infectious agent.
- Essential structural features largely defined, including 2 crystal structures [xxvi,xxvii]
- Minimal ligation activity demonstrated (for engineering through *in vitro* selection) [xxviii]
- Complete kinetic framework established for two or more ribozymes [xxix].
- Chemical modification investigation of important residues well established [xxx].

Hairpin Ribozyme

- Size: ~50 nucleotides.
- Requires the target sequence GUC immediately 3' of the cleavage site.
- Binds 4-6 nucleotides at the 5'-side of the cleavage site and a variable number to the 3'-side of the cleavage site.
- Reaction mechanism: attack by 2'-OH 5' to the scissile bond to generate cleavage products with 2',3'-cyclic phosphate and 5'-OH ends.
- 3 known members of this class. Found in three plant pathogen (satellite RNAs of the tobacco ringspot virus, arabis mosaic virus and chicory yellow mottle virus) which uses RNA as the infectious agent.
- Essential structural features largely defined [xxxi,xxxii,xxxiii,xxxiv]

Table 1

- Ligation activity (in addition to cleavage activity) makes ribozyme amenable to engineering through *in vitro* selection [xxxv].
- Complete kinetic framework established for one ribozyme [xxxvi].
- Chemical modification investigation of important residues begun [xxxvii, xxxviii].

Hepatitis Delta Virus (HDV) Ribozyme

- Size: ~60 nucleotides.
- Trans cleavage of target RNAs demonstrated [xxxix].
- Binding sites and structural requirements not fully determined, although no sequences 5' of cleavage site are required. Folded ribozyme contains a pseudoknot structure [xl].
- Reaction mechanism: attack by 2'-OH 5' to the scissile bond to generate cleavage products with 2',3'-cyclic phosphate and 5'-OH ends.
- Only 2 known members of this class. Found in human HDV.
- Circular form of HDV is active and shows increased nuclease stability [xli].

- i. Michel, Francois; Westhof, Eric. Slippery substrates. *Nat. Struct. Biol.* (1994), 1(1), 5-7.
- ii. Lisacek, Frederique; Diaz, Yolande; Michel, Francois. Automatic identification of group I intron cores in genomic DNA sequences. *J. Mol. Biol.* (1994), 235(4), 1206-17.
- iii. Herschlag, Daniel; Cech, Thomas R. Catalysis of RNA cleavage by the Tetrahymena thermophila ribozyme. 1. Kinetic description of the reaction of an RNA substrate complementary to the active site. *Biochemistry* (1990), 29(44), 10159-71.
- iv. Herschlag, Daniel; Cech, Thomas R. Catalysis of RNA cleavage by the Tetrahymena thermophila ribozyme. 2. Kinetic description of the reaction of an RNA substrate that forms a mismatch at the active site. *Biochemistry* (1990), 29(44), 10172-80.
- v. Knitt, Deborah S.; Herschlag, Daniel. pH Dependencies of the Tetrahymena Ribozyme Reveal an Unconventional Origin of an Apparent pKa. *Biochemistry* (1996), 35(5), 1560-70.
- vi. Bevilacqua, Philip C.; Sugimoto, Naoki; Turner, Douglas H.. A mechanistic framework for the second step of splicing catalyzed by the Tetrahymena ribozyme. *Biochemistry* (1996), 35(2), 648-58.
- vii. Li, Yi; Bevilacqua, Philip C.; Mathews, David; Turner, Douglas H.. Thermodynamic and activation parameters for binding of a pyrene-labeled substrate by the Tetrahymena ribozyme: docking is not diffusion-controlled and is driven by a favorable entropy change. *Biochemistry* (1995), 34(44), 14394-9.
- viii. Banerjee, Alok Raj; Turner, Douglas H.. The time dependence of chemical modification reveals slow steps in the folding of a group I ribozyme. *Biochemistry* (1995), 34(19), 6504-12.
- ix. Zarinkar, Patrick P.; Williamson, James R.. The P9.1-P9.2 peripheral extension helps guide folding of the Tetrahymena ribozyme. *Nucleic Acids Res.* (1996), 24(5), 854-8.
- x. Strobel, Scott A.; Cech, Thomas R.. Minor groove recognition of the conserved G.cntdot U pair at the Tetrahymena ribozyme reaction site. *Science* (Washington, D. C.) (1995), 267(5198), 675-9.
- xi. Strobel, Scott A.; Cech, Thomas R.. Exocyclic Amine of the Conserved G.cntdot U Pair at the Cleavage Site of the Tetrahymena Ribozyme Contributes to 5'-Splice Site Selection and Transition State Stabilization. *Biochemistry* (1996), 35(4), 1201-11.
- xii. Sullenger, Bruce A.; Cech, Thomas R.. Ribozyme-mediated repair of defective mRNA by targeted trans-splicing. *Nature* (London) (1994), 371(6498), 619-22.
- xiii. Robertson, H.D.; Altman, S.; Smith, J.D. *J. Biol. Chem.*, 247, 5243-5251 (1972).
- xiv. Forster, Anthony C.; Altman, Sidney. External guide sequences for an RNA enzyme. *Science* (Washington, D. C., 1883-) (1990), 249(4970), 783-6.
- xv. Yuan, Y.; Hwang, E. S.; Altman, S. Targeted cleavage of mRNA by human RNase P. *Proc. Natl. Acad. Sci. USA* (1992) 89, 8006-10.
- xvi. Harris, Michael E.; Pace, Norman R.. Identification of phosphates involved in catalysis by the

Table 1

ribozyme RNase P RNA. RNA (1995), 1(2), 210-18.

^{xvii} . Pan, Tao; Loria, Andrew; Zhong, Kun. Probing of tertiary interactions in RNA: 2'-hydroxyl-base contacts between the RNase P RNA and pre-tRNA. Proc. Natl. Acad. Sci. U. S. A. (1995), 92(26), 12510-14.

^{xviii} . Pyle, Anna Marie; Green, Justin B. Building a Kinetic Framework for Group II Intron Ribozyme Activity: Quantitation of Interdomain Binding and Reaction Rate. Biochemistry (1994), 33(9), 2716-25.

^{xix} . Michels, William J. Jr.; Pyle, Anna Marie. Conversion of a Group II Intron into a New Multiple-Turnover Ribozyme that Selectively Cleaves Oligonucleotides: Elucidation of Reaction Mechanism and Structure/Function Relationships. Biochemistry (1995), 34(9), 2965-77.

^{xx} . Zimmerly, Steven; Guo, Huatao; Eskes, Robert; Yang, Jian; Perlman, Philip S.; Lambowitz, Alan M.. A group II intron RNA is a catalytic component of a DNA endonuclease involved in intron mobility. Cell (Cambridge, Mass.) (1995), 83(4), 529-38.

^{xxi} . Griffin, Edmund A., Jr.; Qin, Zhifeng; Michels, Williams J., Jr.; Pyle, Anna Marie. Group II intron ribozymes that cleave DNA and RNA linkages with similar efficiency, and lack contacts with substrate 2'-hydroxyl groups. Chem. Biol. (1995), 2(11), 761-70.

^{xxii} . Michel, Francois; Ferat, Jean Luc. Structure and activities of group II introns. Annu. Rev. Biochem. (1995), 64, 435-61.

^{xxiii} . Abramovitz, Dana L.; Friedman, Richard A.; Pyle, Anna Marie. Catalytic role of 2'-hydroxyl groups within a group II intron active site. Science (Washington, D. C.) (1996), 271(5254), 1410-13.

^{xxiv} . Daniels, Danette L.; Michels, William J., Jr.; Pyle, Anna Marie. Two competing pathways for self-splicing by group II introns: a quantitative analysis of in vitro reaction rates and products. J. Mol. Biol. (1996), 256(1), 31-49.

^{xxv} . Guo, Hans C. T.; Collins, Richard A.. Efficient trans-cleavage of a stem-loop RNA substrate by a ribozyme derived from Neurospora VS RNA. EMBO J. (1995), 14(2), 368-76.

^{xxvi} . Scott, W.G., Finch, J.T., Aaron, K. The crystal structure of an all RNA hammerhead ribozyme: A proposed mechanism for RNA catalytic cleavage. Cell. (1995), 81, 991-1002.

^{xxvii} . McKay, Structure and function of the hammerhead ribozyme: an unfinished story. RNA, (1996), 2, 395-403.

^{xxviii} . Long, D., Uhlenbeck, O., Hertel, K. Ligation with hammerhead ribozymes. US Patent No. 5,633,133.

^{xxix} . Hertel, K.J., Herschlag, D., Uhlenbeck, O. A kinetic and thermodynamic framework for the hammerhead ribozyme reaction. Biochemistry, (1994) 33, 3374-3385. Beigelman, L., et al., Chemical modifications of hammerhead ribozymes. J. Biol. Chem., (1995) 270, 25702-25708.

^{xxx} . Beigelman, L., et al., Chemical modifications of hammerhead ribozymes. J. Biol. Chem., (1995) 270, 25702-25708.

^{xxxi} . Hampel, Arnold; Tritz, Richard; Hicks, Margaret; Cruz, Phillip. 'Hairpin' catalytic RNA model: evidence for helices and sequence requirement for substrate RNA. Nucleic Acids Res. (1990), 18(2), 299-304.

^{xxxii} . Chowrira, Bharat M.; Berzal-Herranz, Alfredo; Burke, John M. Novel guanosine requirement for catalysis by the hairpin ribozyme. Nature (London) (1991), 354(6351), 320-2.

^{xxxiii} . Berzal-Herranz, Alfredo; Joseph, Simpson; Chowrira, Bharat M.; Butcher, Samuel E.; Burke, John M.. Essential nucleotide sequences and secondary structure elements of the hairpin ribozyme. EMBO J. (1993), 12(6), 2567-73.

^{xxxiv} . Joseph, Simpson; Berzal-Herranz, Alfredo; Chowrira, Bharat M.; Butcher, Samuel E. Substrate selection rules for the hairpin ribozyme determined by in vitro selection, mutation, and analysis of mismatched substrates. Genes Dev. (1993), 7(1), 130-8.

^{xxxv} . Berzal-Herranz, Alfredo; Joseph, Simpson; Burke, John M. In vitro selection of active hairpin ribozymes by sequential RNA-catalyzed cleavage and ligation reactions. Genes Dev. (1992), 6(1), 129-34.

^{xxxvi} . Hegg, Lisa A.; Fedor, Martha J.. Kinetics and Thermodynamics of Intermolecular Catalysis by Hairpin Ribozymes. Biochemistry (1995), 34(48), 15813-28.

^{xxxvii} . Grasby, Jane A.; Mersmann, Karin; Singh, Mohinder; Gait, Michael J.. Purine Functional Groups in Essential Residues of the Hairpin Ribozyme Required for Catalytic Cleavage of RNA. Biochemistry

Table 1

(1995), 34(12), 4068-76.

^{xxxviii} Schmidt, Sabine; Beigelman, Leonid; Karpeisky, Alexander; Usman, Nassim; Sorensen, Ulrik S.; Gait, Michael J.. Base and sugar requirements for RNA cleavage of essential nucleoside residues in internal loop B of the hairpin ribozyme: implications for secondary structure. *Nucleic Acids Res.* (1996), 24(4), 573-81.

^{xxxix} Perrotta, Anne T.; Been, Michael D.. Cleavage of oligoribonucleotides by a ribozyme derived from the hepatitis delta virus RNA sequence. *Biochemistry* (1992), 31(1), 16-21.

^{xl} Perrotta, Anne T.; Been, Michael D.. A pseudoknot-like structure required for efficient self-cleavage of hepatitis delta virus RNA. *Nature (London)* (1991), 350(6317), 434-6.

^{xli} Puttaraju, M.; Perrotta, Anne T.; Been, Michael D.. A circular trans-acting hepatitis delta virus ribozyme. *Nucleic Acids Res.* (1993), 21(18), 4253-8.

Table 2

Table 2:

A. 2.5 μ mol Synthesis Cycle ABI 394 Instrument

Reagent	Equivalents	Amount	Wait Time* DNA	Wait Time* 2'-O-methyl	Wait Time* RNA
Phosphoramidites	6.5	163 μ L	45 sec	2.5 min	7.5 min
S-Ethyl Tetrazole	23.8	238 μ L	45 sec	2.5 min	7.5 min
Acetic Anhydride	100	233 μ L	5 sec	5 sec	5 sec
N-Methyl Imidazole	186	233 μ L	5 sec	5 sec	5 sec
TCA	176	2.3 mL	21 sec	21 sec	21 sec
Iodine	11.2	1.7 mL	45 sec	45 sec	45 sec
Beaucage	12.9	645 μ L	100 sec	300 sec	300 sec
Acetonitrile	NA	6.67 mL	NA	NA	NA

B. 0.2 μ mol Synthesis Cycle ABI 394 Instrument

Reagent	Equivalents	Amount	Wait Time* DNA	Wait Time* 2'-O-methyl	Wait Time* RNA
Phosphoramidites	15	31 μ L	45 sec	233 sec	485 sec
S-Ethyl Tetrazole	38.7	31 μ L	45 sec	233 min	485 sec
Acetic Anhydride	655	124 μ L	5 sec	5 sec	5 sec
N-Methyl Imidazole	1245	124 μ L	5 sec	5 sec	5 sec
TCA	700	732 μ L	10 sec	10 sec	10 sec
Iodine	20.6	244 μ L	15 sec	15 sec	15 sec
Beaucage	7.7	232 μ L	100 sec	300 sec	300 sec

Table 2

Acetonitrile		NA	2.64 mL	NA	NA	NA
C. 0.2 μ mol Synthesis Cycle 96 well Instrument						
Reagent	Equivalents DNA/2'-O-methyl/Ribo	Amount DNA/2'-O-methyl/Ribo	Wait Time* DNA	Wait Time* 2'-O- methyl	Wait Time* Ribo	
Phosphoramidites	22/33/66	40/60/120 μ L	60 sec	180 sec	360sec	
S-Ethyl Tetrazole	70/105/210	40/60/120 μ L	60 sec	180 min	360 sec	
Acetic Anhydride	265/265/265	50/50/50 μ L	10 sec	10 sec	10 sec	
N-Methyl Imidazole	502/502/502	50/50/50 μ L	10 sec	10 sec	10 sec	
TCA	238/475/475	250/500/500 μ L	15 sec	15 sec	15 sec	
Iodine	6.8/6.8/6.8	80/80/80 μ L	30 sec	30 sec	30 sec	
Beaucage	34/51/51	80/120/120	100 sec	200 sec	200 sec	
Acetonitrile	NA	1150/1150/1150 μ L	NA	NA	NA	

* Wait time does not include contact time during delivery.

Table 3: Human PTP-IB Hammerhead Ribozyme and Target Sequence

Nt. Position	Ribozyme Sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
15	UGCCGUCUC CUGAUGAG X CGAA AGGCGUCG	1	CGCGGCGCT A GAGCGGCA	529
72	AUCUCCAUC CUGAUGAG X CGAA AGCGGCCA	2	TGGCCCGT C ATCGAGAT	530
92	UCUGCUCG CUGAUGAG X CGAA ACUCUUUU	3	AAAGGAGT T CGAGCAGA	531
93	AUCGUCUC CUGAUGAG X CGAA AACUCCUU	4	AAGGAGTT C GAGCAGAT	532
102	GACUUGUC CUGAUGAG X CGAA AUCUUCUC	5	GAGCAGAT C GACAAGTC	533
110	AGCUCGCC CUGAUGAG X CGAA ACUUGUCG	6	CGACAAGT C CGGAGGCT	534
129	UCCUGGUA CUGAUGAG X CGAA AUGGCCGC	7	GCGGCCAT T TACCAAGA	535
130	AUCCUGGU CUGAUGAG X CGAA AAUGGCCG	8	CGGCCATT T ACCAGGAT	536
131	UAUCCUGG CUGAUGAG X CGAA AAAUGGCC	9	GGCCATTT A CCAGGATA	537
139	AUGUCGGA CUGAUGAG X CGAA AUCCUGGU	10	ACCAGGAT A TCGACAT	538
141	UCAUGGCG CUGAUGAG X CGAA AUUCCUGU	11	CAGGATAT C CGACATGA	539
161	UACAUGGG CUGAUGAG X CGAA AGUCACUG	12	CAGTGACT T CCGATGTA	540
162	CUACAUGG CUGAUGAG X CGAA AAGUCACU	13	AUTGACTT C CCGATGTA	541
169	GGCCACUC CUGAUGAG X CGAA ACAUGGGA	14	TCCCATGT A GAGTGGCC	542
183	UUCUUGAG CUGAUGAG X CGAA AGCUUGGC	15	GCCAAGCT T CCTAAGAA	543
184	GUUCUUGG CUGAUGAG X CGAA AAGCUUGG	16	CCAAGCT C CTAAGAAC	544
187	UUUGUUCU CUGAUGAG X CGAA AGGAAGCU	17	AGCTTCCT A AGAACAA	545
205	UCUGUACC CUGAUGAG X CGAA AUUUGGUU	18	ACCGAAT A GGTACAGA	546
209	CGUCUCUG CUGAUGAG X CGAA ACCUAUUU	19	AAATAGT A CAGAGAGG	547
219	AAGGGACU CUGAUGAG X CGAA AGCUUCU	20	AGAGACGT C AGTCCCTT	548
223	GUCMAAGC CUGAUGAG X CGAA ACUGACGU	21	AGTCAAGT C CCTTTGAC	549
227	UAUGGUCA CUGAUGAG X CGAA AGGGACUG	22	CAGTCCCT T TGACCATTA	550
228	CUAUGGUC CUGAUGAG X CGAA AAGGGACU	23	AGTCCCTT T GACCATAG	551
235	AAUCCGAC CUGAUGAG X CGAA AUUGUCAA	24	TTGACCAT A GTGGGATT	552
238	UUUAUCC CUGAUGAG X CGAA ACUAUGGU	25	ACCATAGT C GGATTAAA	553
243	UGUAGUUU CUGAUGAG X CGAA AUCCGACU	26	AGTCGGAT T AAATACAA	554
244	AUGUAGUU CUGAUGAG X CGAA AAUCCGAC	27	GTCCGATT A AACTACAT	555
249	UCUUGAUG CUGAUGAG X CGAA AGUUAUUU	28	ATTAAACT A CATCAAGA	556
253	AUCUUCUU CUGAUGAG X CGAA AUUGUAGU	29	AATACAT C AAGAAGAT	557
262	AUAGUCAU CUGAUGAG X CGAA AUCUUCUU	30	AAGAAGAT A ATGACTAT	558
269	CGUUGAUA CUGAUGAG X CGAA AGUCAUUA	31	TAATAGCT A TATCAACG	559
271	AGCGUUGA CUGAUGAG X CGAA AUAGUCAU	32	ATGACTAT A TCAACGCT	560
273	CUAGCGUU CUGAUGAG X CGAA AUUAGUUC	33	GACTATAT C AAGCGTAG	561
280	UAUCAAAC CUGAUGAG X CGAA AGCGUUGA	34	TCAACGCT A GTTTGATA	562
283	UUUUAUCA CUGAUGAG X CGAA ACUGACGU	35	ACUCTAGT T TGATAAAA	563
284	UUUUUAUC CUGAUGAG X CGAA AACUAGCG	36	CGCTAGTT T GATAAAAA	564
288	UCCAUUUU CUGAUGAG X CGAA AUCAAAAU	37	AGTTTGAT A AAAATGGA	565
313	AAGAAUUG CUGAUGAG X CGAA ACUCCUUU	38	MAAGGAGT T ACATTCTT	566
314	UAGAAUUG CUGAUGAG X CGAA AACUCCUU	39	AAGGAGTT A ATTCTTTA	567
318	UGGUAUAG CUGAUGAG X CGAA AUGUAUAC	40	AGTTACAT T CTTAACCA	568
319	CUGGUAUA CUGAUGAG X CGAA AAUUGAAC	41	GTTCATCT C TTACCCAG	569
321	CCCUGGUG CUGAUGAG X CGAA AGAAUUGA	42	TACATTCT T ACCCAGGG	570
322	GCCUUGUG CUGAUGAG X CGAA AAGAAUUG	43	ACATTCTT A CCGAGGCG	571
334	GUUAGGCA CUGAUGAG X CGAA AGGGCCCU	44	AGGCGCTT T TGCGTAA	572

Table 3

335	UGUAGGC	CUGAUGAG	X	CGAA	AAGGGCCC	45	GGGCCCTT	T	GCCTAACA	573
340	GCAUGUGU	CUGAUGAG	X	CGAA	AGGCAAG	46	CTTTGCTT	A	ACACATGC	574
352	CCAAAGU	CUGAUGAG	X	CGAA	ACCGCAUG	47	CATGCGGT	C	ACTTTTGG	575
356	UCUCCAA	CUGAUGAG	X	CGAA	AGUGACG	48	CGGTCACT	T	TTGGGAGA	576
357	AUCUCCA	CUGAUGAG	X	CGAA	AAGUGACC	49	GGTCACCT	T	TGGAGAGT	577
358	CAUCUCC	CUGAUGAG	X	CGAA	AAGUGAC	50	GTCACCTT	T	GGGAGATG	578
393	AGCAUGAC	CUGAUGAG	X	CGAA	ACACCCCU	51	AGGGGTGT	C	GTCACTGT	579
396	UUGACAU	CUGAUGAG	X	CGAA	ACGACACC	52	GGTGTGCT	C	ATGCTCAA	580
402	ACUCUGU	CUGAUGAG	X	CGAA	AGCAUGAC	53	GTCATGCT	C	AACAGAGT	581
424	UUUUAACG	CUGAUGAG	X	CGAA	ACCUUUCU	54	AGAAAGGT	T	CGTTAAAT	582
425	AUUUUAAC	CUGAUGAG	X	CGAA	AAUCUUUC	55	GAAGAGTT	C	GTTAAAT	583
428	CGCAUUU	CUGAUGAG	X	CGAA	ACGAACCU	56	AGTTTGGT	T	AAAATGCG	584
429	GCCAUUU	CUGAUGAG	X	CGAA	AACGAACC	57	GGTTCCTT	A	AAATGCGC	585
443	GUGGCCAG	CUGAUGAG	X	CGAA	AUUGUGCG	58	CGCACAA	T	CTGGCCAC	586
474	UCUUCAAA	CUGAUGAG	X	CGAA	AUCAUCUC	59	GAGATGAT	C	TTTGAAGA	587
476	UGUCUUA	CUGAUGAG	X	CGAA	AGAUCAUC	60	GATGATCT	T	TGAAGACA	588
477	GUGUCUUC	CUGAUGAG	X	CGAA	AAGAUCAU	61	ATGATCTT	T	GAAGACAC	589
490	UAUUUUA	CUGAUGAG	X	CGAA	AUUUGUGU	62	ACACAAAT	T	TGAATATA	590
491	UUAAUUUC	CUGAUGAG	X	CGAA	AAUUUGUG	63	CACAAATT	T	GAAATATA	591
497	UCAUGU	CUGAUGAG	X	CGAA	AUUUCAA	64	TTTGAAT	T	AACATTGA	592
498	AUCAUGU	CUGAUGAG	X	CGAA	AAUUCAA	65	TTGAAT	A	ACATTGAT	593
503	CAGAGU	CUGAUGAG	X	CGAA	AUGUAAU	66	ATTAACAT	T	GATCTCTG	594
507	UCUUCAGA	CUGAUGAG	X	CGAA	AUCAUGU	67	ACATTGAT	C	TCTGAAGA	595
509	UAUCUUA	CUGAUGAG	X	CGAA	AGAUCAU	68	ATGATCT	C	TGAAGATA	596
517	UGACUUGA	CUGAUGAG	X	CGAA	AUCUUCAG	69	CTGAAGAT	A	TCAAGTCA	597
519	UAUGACU	CUGAUGAG	X	CGAA	AUAUCUUC	70	GAAGATAT	C	AAGTCTAT	598
524	UAUAUAU	CUGAUGAG	X	CGAA	ACUUGAUA	71	TATCAAGT	C	ATATTATA	599
527	CUGUAUA	CUGAUGAG	X	CGAA	AUGACUUG	72	CAAGTCAT	A	TTATACAG	600
529	CACUGUAU	CUGAUGAG	X	CGAA	AUAUGACU	73	AGTCATAT	T	ATACAGTG	601
530	GCACUGUA	CUGAUGAG	X	CGAA	AAUAGAC	74	GTCATATT	A	TACAGTGC	602
532	UCGCACUG	CUGAUGAG	X	CGAA	AUAUAUG	75	CATATTAT	A	CAGTGGGA	603
546	UCCAAUUC	CUGAUGAG	X	CGAA	AGCUGUCG	76	CGACAGCT	A	GAATTGGA	604
551	GGUUUCC	CUGAUGAG	X	CGAA	AUUCUAGC	77	GCTAGAAT	T	GGAAACC	605
561	UGGGUUGU	CUGAUGAG	X	CGAA	AGGUUUUC	78	GAUAACCT	T	ACAACCA	606
562	UUGGGUUG	CUGAUGAG	X	CGAA	AAGGUUUU	79	AAAACCTT	A	CAACCCAA	607
577	GAUCUCUC	CUGAUGAG	X	CGAA	AGUUUCU	80	AAGAAGCT	C	GAGAGATC	608
585	AAAGUUA	CUGAUGAG	X	CGAA	AUCUCUCG	81	CGAGAGAT	C	TTACATT	609
587	GGAAAGU	CUGAUGAG	X	CGAA	AGAUCCU	82	AGAGATCT	T	ACTATTCC	610
588	UGGAAAG	CUGAUGAG	X	CGAA	AAGAUCCU	83	GAGATCTT	A	CAATTCCA	611
592	AUAGUGGA	CUGAUGAG	X	CGAA	AUGUAAGA	84	TCTTACAT	T	TCCACTAT	612
593	UAUAGUGG	CUGAUGAG	X	CGAA	AAUGUAAG	85	CTTACATT	T	CCACTATA	613
594	GUUAUGUG	CUGAUGAG	X	CGAA	AAAGUUA	86	TTACATT	C	CACATATC	614
599	AUGUGGUA	CUGAUGAG	X	CGAA	AGUGGAAA	87	TTTCCACT	A	TACCACAT	615
601	CCAUGUGG	CUGAUGAG	X	CGAA	AUAGUGGA	88	TCCACTAT	A	CCACTGCG	616
617	GGACUCCA	CUGAUGAG	X	CGAA	AGUCAGGC	89	GCCTGACT	T	TGGAGTCC	617
618	GGGACUCC	CUGAUGAG	X	CGAA	AAGUCAGG	90	CCTGACTT	T	GGAGTCCC	618
624	GAUUCAGG	CUGAUGAG	X	CGAA	ACUCCAAA	91	TTTGGAGT	C	CCTGAATC	619

Table 3

632	AGGCUGGU	CUGAUGAG	X	CGAA	AUUCAGGG	92	CCCTGAAT	C	ACCAGCCT	620
641	UCAAGAAU	CUGAUGAG	X	CGAA	AGGCUGGU	93	ACCAGCCT	C	ATTCTTGA	621
644	AGUUCRAG	CUGAUGAG	X	CGAA	AUGAGGCU	94	AGCCTCAT	T	CTTGAACCT	622
645	AGUUCRAG	CUGAUGAG	X	CGAA	AUAGAGGC	95	GCCTCAT	C	TGGAACCT	623
647	GAAGUUC	CUGAUGAG	X	CGAA	AGAUGAG	96	CTCATTTCT	T	GAACCTTC	624
653	UGAAAAGA	CUGAUGAG	X	CGAA	AGUUCAG	97	CTTGAACCT	T	CTTTTTC	625
654	UUGAAAAG	CUGAUGAG	X	CGAA	AGUUCAA	98	TGGAACCT	T	CTTTTCA	626
655	UUUGAAA	CUGAUGAG	X	CGAA	AGAUGCA	99	TGAACCTT	C	TTTTCAA	627
657	ACUUUGAA	CUGAUGAG	X	CGAA	AGAAAAGU	100	AACTTTCT	T	TTCAANGT	628
658	GACUUUGA	CUGAUGAG	X	CGAA	AAGAAAGU	101	AACTTTCT	T	TTCAANGT	629
659	GGACUUUG	CUGAUGAG	X	CGAA	AAAGAAAG	102	CTTTCTTT	T	CAAGTCC	630
660	CGACUUU	CUGAUGAG	X	CGAA	AAAAGAAA	103	TTTTTTTT	C	AAAGTCC	631
666	GACUCUGG	CUGAUGAG	X	CGAA	ACUUUGAA	104	TTCAAGT	C	CGAGAGTC	632
674	GUGACCTU	CUGAUGAG	X	CGAA	ACUCUCGG	105	CCGAGAGT	C	AGGTCAC	633
680	GGCUGAGU	CUGAUGAG	X	CGAA	ACCCUGAC	106	GTCAGGGT	C	ACTCAGCC	634
684	UCGGGGCU	CUGAUGAG	X	CGAA	AGUGACCC	107	GGGTCACT	C	AGGCCGGA	635
705	UGACACAC	CUGAUGAG	X	CGAA	ACGGGCC	108	GGGCCCGT	T	GTGGTGA	636
729	GACCUGCC	CUGAUGAG	X	CGAA	AUGCCUGC	109	GCAGGCAT	C	GGCAGGTC	637
737	AGGUUCCA	CUGAUGAG	X	CGAA	ACUUGCCG	110	CGGCAGGT	C	TGGAACCT	638
746	CCAGACAG	CUGAUGAG	X	CGAA	AGGUUCCA	111	TGGAACCT	T	CTGTCTGG	639
747	GCCAGACA	CUGAUGAG	X	CGAA	AAGGUUCC	112	GGAACCTT	C	GTGCTGGC	640
751	AUCAGCCA	CUGAUGAG	X	CGAA	ACAGAAGG	113	CCTTCTGT	C	TGGCTGAT	641
760	GAGGACAG	CUGAUGAG	X	CGAA	AUCAGCCA	114	TGGCTGAT	A	CTGCTCTC	642
768	AUCAGCAA	CUGAUGAG	X	CGAA	AGGCAGGU	115	ACCTGCCT	C	TTGCTGAT	643
770	CCAUCAGC	CUGAUGAG	X	CGAA	AGAGGCAG	116	CTGCCCTT	T	GCTGATGG	644
796	AACGGAAAG	CUGAUGAG	X	CGAA	AGGUCU	117	AGACCTT	T	CTTCCGTT	645
797	CAACGGAA	CUGAUGAG	X	CGAA	AAGGUCU	118	AGACCTT	C	TTCCGTTG	646
799	AUCAACGG	CUGAUGAG	X	CGAA	AGAAGGU	119	ACCTTCTT	T	CCGTTGAT	647
800	UAUCAACG	CUGAUGAG	X	CGAA	AAGAAGGG	120	CCCTTCTT	C	CGTTGATA	648
804	UUGAUUUC	CUGAUGAG	X	CGAA	ACGGAAGA	121	TCTTCCGT	T	GATATCAA	649
808	UUUCUUGA	CUGAUGAG	X	CGAA	AUCAACGG	122	CCGTTGAT	A	CAAGAA	650
810	ACUUUCUU	CUGAUGAG	X	CGAA	AUAUCAAC	123	GTTGATAT	C	AAGAAAGT	651
824	UCAUUUCU	CUGAUGAG	X	CGAA	ACAGCACU	124	AGTCTGTT	T	AGAATGAA	652
825	CUCAUUUC	CUGAUGAG	X	CGAA	AACAGCAC	125	GTCCTGTT	A	GAATGAG	653
839	CCAUCGGA	CUGAUGAG	X	CGAA	ACUUCUUC	126	GAGGAAGT	T	TCGGATGG	654
840	CCCAUCCG	CUGAUGAG	X	CGAA	AAUUCUUC	127	AGGAAGTT	T	CGGATGGG	655
841	CCCCAUCC	CUGAUGAG	X	CGAA	AAAUUCUCC	128	GGAAAGTTT	C	GGATGGGG	656
855	GCUGUCUG	CUGAUGAG	X	CGAA	AUCAGCCC	129	GGGCTGAT	C	CAGACAGC	657
878	GGUAGGAG	CUGAUGAG	X	CGAA	AGCGCAGC	130	GCTGCGCT	T	CTCTTACC	658
879	AGGUAGGA	CUGAUGAG	X	CGAA	AAGCGCAG	131	CTGCGCTT	C	TCTTACCT	659
881	CCAGGUAG	CUGAUGAG	X	CGAA	AGAAGCGC	132	GGGCTTCT	C	CTACTGG	660
884	CAGCCAGG	CUGAUGAG	X	CGAA	AGGAGAG	133	CTTCTCCT	A	CCTGGCTG	661
897	GCACUUCU	CUGAUGAG	X	CGAA	AUCACAGC	134	GCTGTGAT	C	GAAGGTGC	662
911	CCAUGAUG	CUGAUGAG	X	CGAA	AUUUGGCA	135	TGCCAAAT	T	CATCATGG	663
912	CCCAUGAU	CUGAUGAG	X	CGAA	AUUUGGCG	136	GCCAAAT	C	ATCATGGG	664
915	UCCCCAU	CUGAUGAG	X	CGAA	AUGAAUUU	137	AAATTTCAT	C	ATGGGGGA	665
926	GCACGGAA	CUGAUGAG	X	CGAA	AGUCCCCC	138	GGGGGACT	C	TTCCGTGC	666

Table 3

928	CUGCACGG	CUGAUGAG	X	CGAA	AGAGUCCC	139	GGGACTCT	T	CCGTGCAG	667
929	CCUGCACG	CUGAUGAG	X	CGAA	AAGAGUCC	140	GGACTCTT	C	CGTGCAGG	668
940	CUUCCACU	CUGAUGAG	X	CGAA	AUCCUGCA	141	TGCAGGAT	C	AGTGGAA	669
954	UCUGGGGA	CUGAUGAG	X	CGAA	AGCUCCUU	142	AAGGAGCT	T	TCCCACGA	670
955	CUCUGGGG	CUGAUGAG	X	CGAA	AAGCUCCU	143	AGGAGCTT	T	CCCACGAG	671
956	CCUCUGGG	CUGAUGAG	X	CGAA	AAAGCUCC	144	GGAGCTTT	C	CCACGAGG	672
988	UGGGGGGA	CUGAUGAG	X	CGAA	AUGCUCGG	145	CCGAGCAT	A	TCCCCACA	673
990	GGUGGGGG	CUGAUGAG	X	CGAA	AUAUGCUC	146	GAGCATAT	C	CCCCACCC	674
1000	UGGCCGGG	CUGAUGAG	X	CGAA	AGGUGGGG	147	CCCCACCT	C	CCCGGCCA	675
1020	GGCUCGAG	CUGAUGAG	X	CGAA	AUUCGUUU	148	AAACGAAT	C	CTGAGGCC	676
1052	UUUGGGAAG	CUGAUGAG	X	CGAA	ACUCCCUU	149	CAGGGAGT	T	CTTCCCAA	677
1053	UUUGGGAA	CUGAUGAG	X	CGAA	AACUCCUU	150	AGGGAGTT	C	TTCCCAAA	678
1055	GAUUUGGG	CUGAUGAG	X	CGAA	AGAACUCC	151	GGAGTTCT	T	CCCAATTC	679
1056	UGAUUUGG	CUGAUGAG	X	CGAA	AAGAACUC	152	GAGTTCTT	C	CCAAATCA	680
1063	CCACUGGU	CUGAUGAG	X	CGAA	AUUUGGGA	153	TCCCAATC	C	ACCGATGG	681
1096	GCAGUCUU	CUGAUGAG	X	CGAA	AUCCUCCU	154	AGGAGGAT	A	AAGACTGC	682
1110	UCUUCUUU	CUGAUGAG	X	CGAA	AUGGGGCA	155	TGCCCATC	C	AAGGAAGA	683
1133	CGCAUUUU	CUGAUGAG	X	CGAA	AGGGGCUU	156	AAGCCCTT	T	AAATGCG	684
1134	GCGGCAUU	CUGAUGAG	X	CGAA	AAGGGGCU	157	AGCCCTCT	A	AATGCGCC	685
1148	CGAUGCCG	CUGAUGAG	X	CGAA	AGGGUGCG	158	CGCACCTT	A	CGGCATCG	686
1155	AUGCUUUC	CUGAUGAG	X	CGAA	AUGCCGUA	159	TAGCGCAT	C	GAAGCAT	687
1168	AGUUCUUU	CUGAUGAG	X	CGAA	ACUCAUGC	160	GCATGAGT	C	AAGCACT	688
1182	CGACUUCU	CUGAUGAG	X	CGAA	ACUUCAGU	161	ACTGAAGT	T	AGAAGTCG	689
1183	CCGACUUC	CUGAUGAG	X	CGAA	AACUUCAG	162	CTGAAGTT	A	GAAGTCGG	690
1189	CACGACCC	CUGAUGAG	X	CGAA	ACUUCUAA	163	TTAGAAGT	C	GGTCTGTC	691
1194	CCCCCCAC	CUGAUGAG	X	CGAA	ACCCGACU	164	AGTCGGGT	C	GTGGGGGG	692
1207	ACCTCGAA	CUGAUGAG	X	CGAA	ACUUCCCC	165	GGGGAAGT	C	TTGAGGTT	693
1209	GCACCCUC	CUGAUGAG	X	CGAA	AGACUUCU	166	GGAGGTCT	T	CGAGGTGC	694
1210	GGCACUUC	CUGAUGAG	X	CGAA	AAGACUUC	167	GAAGTCTT	C	GAGGTGCC	695
1229	UGGCUUGG	CUGAUGAG	X	CGAA	AGGCAGCC	168	GGCTGCCT	C	CCCAGCCA	696
1250	CGGGCAGU	CUGAUGAG	X	CGAA	ACGGCUCC	169	GGAGCCGT	C	ACTGCCCG	697
1285	CUUCCAGU	CUGAUGAG	X	CGAA	ACUCAUGU	170	CAGTGAAT	T	ACTGGGAG	698
1286	GTUCCAG	CUGAUGAG	X	CGAA	AACUUCAGU	171	ACTGAGTT	A	CTGGAAGC	699
1298	UGACCAGG	CUGAUGAG	X	CGAA	AGGGCUUC	172	GAAGCCCT	T	CCTGGTCA	700
1299	UUGACCAG	CUGAUGAG	X	CGAA	AAGGGCUU	173	AAGCCCTT	C	CTGGTCAA	701
1305	CACAUUUU	CUGAUGAG	X	CGAA	ACCGAGAA	174	TTCTGTGT	C	AACATGTG	702
1321	GAGGACCG	CUGAUGAG	X	CGAA	AGCCACGC	175	CGGTGGCT	A	CGGTCTTC	703
1326	GCGUGAG	CUGAUGAG	X	CGAA	ACCGUAGC	176	GCTACGGT	C	CTCACGCG	704
1329	CCGCGCGU	CUGAUGAG	X	CGAA	AGGACCGU	177	ACGGTCTT	C	ACGGCGGG	705
1342	GCAGAGGU	CUGAUGAG	X	CGAA	AGCGCCCG	178	CCGGCGCT	T	ACCTCTGC	706
1343	AGCAGAGG	CUGAUGAG	X	CGAA	AAGCGCCG	179	CGGCGCTT	A	CCTCTGCT	707
1347	CUUGAGCA	CUGAUGAG	X	CGAA	AGGUUAAGC	180	GCTTACCT	C	TGCTACAG	708
1352	GGAAACUG	CUGAUGAG	X	CGAA	AGCAGAGG	181	CCTCTGCT	A	CAGGTTCC	709
1358	UGAACAGG	CUGAUGAG	X	CGAA	ACCUUGAG	182	CTACAGGT	T	CCTGTTC	710
1359	UUGAACAG	CUGAUGAG	X	CGAA	AACCUUGA	183	TACAGGTT	C	CTGTTCAA	711
1364	UGCUGUUG	CUGAUGAG	X	CGAA	ACAGGAAC	184	GTCTCTGT	T	CAACAGCA	712
1365	UUGCUGUU	CUGAUGAG	X	CGAA	AACAGGAA	185	TTCTGTGT	C	AACAGCAA	713

Table 3

1379	GGUCAGGC	CUGAUGAG	X	CGAA	AUGUGUUG	186	CAACACAT	A	GCCTGACC	714
1390	GAGUGGAG	CUGAUGAG	X	CGAA	AGGUCAG	187	CTGACCCCT	C	CTCCACTC	715
1393	GUGGAGUG	CUGAUGAG	X	CGAA	AGGAGGGU	188	ACCCTCCT	C	CACTCCAC	716
1398	UGGAGGUG	CUGAUGAG	X	CGAA	AGUGGAGG	189	CCTCCACT	C	CACCTCCA	717
1404	AGUGGGUG	CUGAUGAG	X	CGAA	AGGUGGAG	190	CTCCACCT	C	CACCCACT	718
1415	CAGAGGCG	CUGAUGAG	X	CGAA	ACAGUGGG	191	CCCACTGT	C	CGCTCTTG	719
1421	UGCGGGCA	CUGAUGAG	X	CGAA	AGGCGGAC	192	GTCGGCTC	C	TGCCCGCA	720
1446	AUGCCUGC	CUGAUGAG	X	CGAA	AGUGGGGC	193	GTCCACCT	A	GCAGGCAT	721
1463	CCUUAACC	CUGAUGAG	X	CGAA	ACCGCGGC	194	GCCGCGT	A	GGTAAGGG	722
1467	GCUGCCCU	CUGAUGAG	X	CGAA	ACCUACCG	195	CGTACGT	A	AGGGCCGC	723
1486	CGGCUCUC	CUGAUGAG	X	CGAA	ACGCGGUC	196	GACCGGT	A	GAGAGCG	724
1511	GCAGAAC	CUGAUGAG	X	CGAA	ACGUGCCU	197	ACGACGT	T	GGTCTCG	725
1515	UAGUGCAG	CUGAUGAG	X	CGAA	ACCAACGU	198	ACGTTGGT	T	CTGCACTA	726
1516	UAGUGCA	CUGAUGAG	X	CGAA	AACCAACG	199	CGTTGGT	T	TGCACTAA	727
1523	AUGGGUUU	CUGAUGAG	X	CGAA	AGUGCAGA	200	TCGCACT	A	AAACCAT	728
1532	CCGGGGAA	CUGAUGAG	X	CGAA	AUGGGUUU	201	AAACCAT	C	TTCCCGGG	729
1534	AUCCGGGG	CUGAUGAG	X	CGAA	AGAUGGGU	202	ACCCATCT	T	CCCCGGAT	730
1535	CAUCCGGG	CUGAUGAG	X	CGAA	AAGAUGGG	203	CCCATCTT	C	CCCGGATG	731
1549	AGGGGUGA	CUGAUGAG	X	CGAA	ACACACAU	204	ATGTGGT	C	TCAACCTT	732
1551	UGAGGGGU	CUGAUGAG	X	CGAA	AGACACAC	205	GTGTGTCT	C	ACCCCTCA	733
1558	AAAGGGAU	CUGAUGAG	X	CGAA	AGGGGUGA	206	TCACCCCT	C	ATCCTTTT	734
1561	AGUAAAG	CUGAUGAG	X	CGAA	AUGAGGGG	207	CCCTCAT	C	CTTTTACT	735
1564	AAAGUAA	CUGAUGAG	X	CGAA	AGGAUGAG	208	CTCATCCT	T	TATCTTTT	736
1565	AAAAAGUA	CUGAUGAG	X	CGAA	AAGGAUGA	209	TCATCCTT	T	TACTTTTT	737
1566	CAAAAGU	CUGAUGAG	X	CGAA	AAAGGAUG	210	CATCCTTT	T	ACTTTTTG	738
1567	GCAAAAG	CUGAUGAG	X	CGAA	AAAGGAU	211	ATCCTTTT	A	CTTTTTCG	739
1570	GGGGCAAA	CUGAUGAG	X	CGAA	AGUAAAG	212	CTTTTACT	T	TTTGCCCC	740
1571	AGGGGCA	CUGAUGAG	X	CGAA	AAGUAAAA	213	TTTTACTT	T	TGCGCCTT	741
1572	AAGGGCA	CUGAUGAG	X	CGAA	AAAGUAAA	214	TTTACTTT	T	TGCGCCTT	742
1573	GAAGGGC	CUGAUGAG	X	CGAA	AAAAGUAA	215	TTACTTTT	T	GCCCTTTC	743
1580	CAGAGGG	CUGAUGAG	X	CGAA	AGGGGCAA	216	TGCCCCCT	T	CACTTTTG	744
1581	UCAAGUG	CUGAUGAG	X	CGAA	AAGGGGCA	217	TGCCCCCT	C	CACCTTGA	745
1586	GGUACUCA	CUGAUGAG	X	CGAA	AGUGGAAG	218	CTTCCACT	T	TGAGTACC	746
1587	UGGUACUC	CUGAUGAG	X	CGAA	AAGUGGAA	219	TTCCACTT	T	GAGTACCA	747
1592	GGAUUGG	CUGAUGAG	X	CGAA	ACUCAAG	220	CTTTGAGT	A	CCAAATCC	748
1599	GGCUUGUG	CUGAUGAG	X	CGAA	AUUUGGUA	221	TACCAAT	C	CACAAAGC	749
1610	CCUCAAAA	CUGAUGAG	X	CGAA	AUGGCUUG	222	CAAGCCAT	T	TTTTGAGG	750
1611	UCCUCAAA	CUGAUGAG	X	CGAA	AUUGGCUU	223	AAGCCATT	T	TTTGAGGA	751
1612	CCUCCUCA	CUGAUGAG	X	CGAA	AAUUGGCU	224	AGCCATT	T	TTGAGGAG	752
1613	UCUCCUCA	CUGAUGAG	X	CGAA	AAAAGGCG	225	GCCATTTT	T	TGAGGAGA	753
1614	CUCUCCUC	CUGAUGAG	X	CGAA	AAAAAUGG	226	CCATTTTT	T	GAGGAGAG	754
1634	CAGCAUGG	CUGAUGAG	X	CGAA	ACUCCUCU	227	AAGAGAGT	A	CAATGCTG	755
1665	GAGGGGUG	CUGAUGAG	X	CGAA	AGGCCCCU	228	AGGGGCTC	A	CACCGGTC	756
1673	AGCCCCAA	CUGAUGAG	X	CGAA	ACGGGGUG	229	ACACCGCT	C	TTGGGGCT	757
1675	CGAGCCCC	CUGAUGAG	X	CGAA	AGACGGGU	230	ACCGGCTT	T	GSGGCTCG	758
1682	GGUGGGGC	CUGAUGAG	X	CGAA	AGCCCCAA	231	TTGGGGCT	C	GCCCCACC	759
1698	CCAGGAGG	CUGAUGAG	X	CGAA	AGCCCGUG	232	CCAGGGCT	C	CCTTCTGG	760

Table 3

1702	UGCUCAG	CUGAUGAG	X	CGAA	AGGGAGCC	233	GGCTCCCT	C	CTGGAGCA	761
1712	CCGCCGG	CUGAUGAG	X	CGAA	AUGCUCCA	234	TGGAGCAT	C	CCAGGCGG	762
1746	GCAGAUUC	CUGAUGAG	X	CGAA	AGGGGGGG	235	CCCCCCT	T	GAATCTGC	763
1751	UCCUCGCA	CUGAUGAG	X	CGAA	AUUCAGG	236	CCTTGAAT	C	TGCAGGGA	764
1766	GGAGUGGA	CUGAUGAG	X	CGAA	AGUUGCUC	237	GAGCAACT	C	TCCATCC	765
1768	AUGGAGUG	CUGAUGAG	X	CGAA	AGAGUUGC	238	GCAACTCT	C	CACTCCAT	766
1773	UAAUAUG	CUGAUGAG	X	CGAA	AGUGGAGA	239	TCTCCACT	C	CATATTTA	767
1777	UAAUAUA	CUGAUGAG	X	CGAA	AUGGAGUG	240	CACCTCAT	A	TTATTTTA	768
1779	UUUAAUA	CUGAUGAG	X	CGAA	AUAUGGAG	241	CTCATAT	T	TATTTAA	769
1780	GUUAAAU	CUGAUGAG	X	CGAA	AUAUGGA	242	TCCATAT	T	ATTTAAAC	770
1781	UGUUUAA	CUGAUGAG	X	CGAA	AUAUAUGG	243	CCATATTT	A	TTTAAACA	771
1783	AUUGUUUA	CUGAUGAG	X	CGAA	AUAUAUUA	244	ATATTTAT	T	TAAACAA	772
1784	AAUUGUUU	CUGAUGAG	X	CGAA	AAUAAUAU	245	TATTTAT	T	AAACAATT	773
1785	AAAUUGUU	CUGAUGAG	X	CGAA	AAAUAAAU	246	ATTATTT	A	AAACAATT	774
1792	GGGAAAA	CUGAUGAG	X	CGAA	AUUGUUUA	247	TAAACAA	T	TTTTCCCC	775
1793	UGGGAAAA	CUGAUGAG	X	CGAA	AAUUGUUU	248	AAACAA	T	TTTTCCCA	776
1794	UUGGGGAA	CUGAUGAG	X	CGAA	AAAUUGUU	249	AAACAATT	T	TTTTCCCA	777
1795	UUUGGGGA	CUGAUGAG	X	CGAA	AAAUUGUU	250	ACAATTT	T	TCCCCAA	778
1796	CUUUGGG	CUGAUGAG	X	CGAA	AAAAAUUG	251	CAATTTT	T	CCCCAAG	779
1797	CCUUGGG	CUGAUGAG	X	CGAA	AAAAAUU	252	AATTTTT	C	CCCCAAG	780
1809	GCAUAUG	CUGAUGAG	X	CGAA	AUGCCUUU	253	AAAGGCAT	C	CATAGTGC	781
1813	UAGUGCAC	CUGAUGAG	X	CGAA	AUGGAUGC	254	GCATCCAT	A	GTGCACTA	782
1821	GAAAAUGC	CUGAUGAG	X	CGAA	AGUGCACU	255	AGTGCAT	A	GCATTTTC	783
1826	UUCAAGAA	CUGAUGAG	X	CGAA	AUGCUGAU	256	ACTAGCAT	T	TCTTGAAC	784
1827	GUUCAAGA	CUGAUGAG	X	CGAA	AAUGCUG	257	CTAGCAT	T	TCTTGAAC	785
1828	GGUUCAG	CUGAUGAG	X	CGAA	AAUUGCUA	258	TAGCAT	T	CTTGAACC	786
1829	UGGUUCAA	CUGAUGAG	X	CGAA	AAAAUGCU	259	AGCATTT	C	TTGAACCA	787
1831	AUUGGUUC	CUGAUGAG	X	CGAA	AGAAAAUG	260	CATTTCT	T	GAACCAAT	788
1840	UAUAUCAU	CUGAUGAG	X	CGAA	AUUGGUUC	261	GAACCAAT	A	ATGTATTA	789
1845	AAUUUUA	CUGAUGAG	X	CGAA	ACAUUAU	262	AATAATGT	A	TTAAAAAT	790
1847	AAAAUUUU	CUGAUGAG	X	CGAA	AUACAUUA	263	TAATGTAT	T	AAAAATTT	791
1848	AAAAUUUU	CUGAUGAG	X	CGAA	AAUACAUU	264	AATGTAT	A	AAATTTTT	792
1853	CAUCAAA	CUGAUGAG	X	CGAA	AUUUUAAU	265	ATTAAAT	T	TTTTGATG	793
1854	ACAUCAAA	CUGAUGAG	X	CGAA	AAUUUUA	266	TAAAAAT	T	TTTGTATG	794
1855	GACAUCAA	CUGAUGAG	X	CGAA	AAAUUUUA	267	TAAAAAT	T	TTTGTATG	795
1856	UGCAUCA	CUGAUGAG	X	CGAA	AAAAUUUU	268	AAATTTT	T	TGATGTCA	796
1857	CUGACAUC	CUGAUGAG	X	CGAA	AAAAUUUU	269	AAATTTT	T	GATGTGAC	797
1863	GCAGGCU	CUGAUGAG	X	CGAA	ACAUCAAA	270	TTGATGT	C	AGCCTTGC	798
1869	CUUGAUGC	CUGAUGAG	X	CGAA	AGGCGAC	271	GTCAAGCT	T	GCATCAAG	799
1874	AAGCCCUU	CUGAUGAG	X	CGAA	AUGCAAGG	272	CCTTGATC	C	AAGGCTTT	800
1882	UUUUGAUA	CUGAUGAG	X	CGAA	AGCCCUUG	273	CAAGGGCT	T	TATCAAAA	801
1883	UUUUUGAU	CUGAUGAG	X	CGAA	AAGCCCUU	274	AAGGGCTT	T	ATCAAAAA	802
1884	CUUUUGA	CUGAUGAG	X	CGAA	AAGCCCUU	275	AGGGCTTT	A	TCAAAAA	803
1886	UACUUUUU	CUGAUGAG	X	CGAA	AUAAAGCC	276	GGCTTTAT	C	AAAAAGTA	804
1894	UAUUUAUG	CUGAUGAG	X	CGAA	ACUUUUUG	277	CAAAAGT	A	CAATAATA	805
1899	GGAUUUAU	CUGAUGAG	X	CGAA	AUUGUACU	278	AGTACAAT	A	ATAAATCC	806
1902	UGAGGAUU	CUGAUGAG	X	CGAA	AUUUAUUG	279	ACAATAAT	A	AATCCTCA	807

Table 3

1906	UACCUGAG	CUGAUGAG	X	CGAA	AUUUAUUA	280	TAATAAAT	C	CTCAGGTA	808
1909	UACUACCU	CUGAUGAG	X	CGAA	AGGAUUUA	281	TAATTCCT	C	AGGTAGTA	809
1914	CCCAGUAC	CUGAUGAG	X	CGAA	ACCUGAGG	282	CCTCAGGT	A	GTACTGGG	810
1917	AUUCUCCAG	CUGAUGAG	X	CGAA	ACUACCUG	283	CAGGTAGT	A	CTGGGAAT	811
1934	CCAUGGCA	CUGAUGAG	X	CGAA	AGCCUUC	284	GGAAAGCT	T	TGCCATGG	812
1935	CCAUGGCG	CUGAUGAG	X	CGAA	AAGCCUUC	285	GAAGGCTT	T	GCCATGGG	813
1954	ACUGGUCU	CUGAUGAG	X	CGAA	ACGCAGCA	286	TGCTCGCT	C	AGACCAGT	814
1963	CUUCCGAG	CUGAUGAG	X	CGAA	ACUGGUCU	287	AGACCGCT	A	CTGGGAAG	815
1981	CUGCUUAC	CUGAUGAG	X	CGAA	ACCGUCCU	288	AGGACGGT	T	GTAAGCAG	816
1984	CAACUGCU	CUGAUGAG	X	CGAA	ACAACCGU	289	ACGGTTGT	A	AGCAATTG	817
1991	UAUAUAAC	CUGAUGAG	X	CGAA	ACUGCUUA	290	TAAGCAGT	T	GTTATTTA	818
1994	CACUAAAU	CUGAUGAG	X	CGAA	ACAACUGC	291	GCAGTTGT	T	ATTATAGT	819
1995	UCACUAAA	CUGAUGAG	X	CGAA	ACAACUG	292	CAGTTGTT	A	TTTAGTGA	820
1997	UAUCACUA	CUGAUGAG	X	CGAA	AUAACAAC	293	GTGTTAT	T	TAGTGATA	821
1998	AUAUACUC	CUGAUGAG	X	CGAA	AUAACAAC	294	TGTTTATT	T	AGTGATAT	822
1999	AAUAUAC	CUGAUGAG	X	CGAA	AAUAACA	295	TGTTTATT	A	GTGATATT	823
2005	ACCCACAA	CUGAUGAG	X	CGAA	AUCACUAA	296	TTAGTGAT	A	TTGTGGGT	824
2007	UUACCCAC	CUGAUGAG	X	CGAA	AUAUACU	297	AGTGATAT	T	GTGGGTAA	825
2014	UCUCACGU	CUGAUGAG	X	CGAA	ACCCACAA	298	TGTGGGT	A	TGCTGAGA	826
2027	CAUUGUUC	CUGAUGAG	X	CGAA	AUCUUCUC	299	GAGAAGAT	A	GAACAATG	827
2038	AUAUAUUA	CUGAUGAG	X	CGAA	AGCAUUGU	300	ACAATGCT	A	TAATATAT	828
2040	UUUAUAU	CUGAUGAG	X	CGAA	AUAGCAUU	301	AATGCTAT	A	ATATATAA	829
2043	UCAUUAUA	CUGAUGAG	X	CGAA	AUUUAUAG	302	GCTATAT	A	TATAATGA	830
2045	GUUCAUUA	CUGAUGAG	X	CGAA	AUAUUAUA	303	TATAATAT	A	TAATGAAC	831
2047	GUGUUAU	CUGAUGAG	X	CGAA	AUAUUAUA	304	TAATATAT	A	ATGAACAC	832
2062	UUUAUAAA	CUGAUGAG	X	CGAA	ACCCACGU	305	ACGTGGGT	A	TTTAATAA	833
2064	UCUUAUUA	CUGAUGAG	X	CGAA	AUACCCAC	306	GTGGGTAT	T	TAATAAGA	834
2065	UUCUUAU	CUGAUGAG	X	CGAA	AUAACCCA	307	TGGGTATT	T	AATAAGAA	835
2066	UUUCUUAU	CUGAUGAG	X	CGAA	AAUACCC	308	GGGTATT	A	ATAAGAAA	836
2069	AUGUUUCU	CUGAUGAG	X	CGAA	AUUAAUA	309	TATTTAAT	A	AGAAACAT	837
2088	GACAAAGU	CUGAUGAG	X	CGAA	AUCUCACA	310	TGTGAGAT	T	ACTTTGTC	838
2089	GGACAAAG	CUGAUGAG	X	CGAA	AUUCUCAC	311	GTGAGATT	A	CTTTGTC	839
2092	GCGGGACA	CUGAUGAG	X	CGAA	AGUAAUUC	312	AGATTACT	T	TGTCGCCG	840
2093	AGCGGGAC	CUGAUGAG	X	CGAA	AAGUAAUC	313	GATTACTT	T	GTCCCGCT	841
2096	AUAAGCGG	CUGAUGAG	X	CGAA	ACAAGUUA	314	TACTTTGT	C	CGCTTAT	842
2102	AGCAGAAU	CUGAUGAG	X	CGAA	AGCGGGAC	315	GTCCCGCT	T	ATTCTGCT	843
2103	GAGCAGAA	CUGAUGAG	X	CGAA	AAGCGGGA	316	TCCCGCTT	A	TTCTGCTC	844
2105	GGGAGCAG	CUGAUGAG	X	CGAA	AUAAGCGG	317	CCGCTTAT	T	CTGCTCCC	845
2106	AGGGAGCA	CUGAUGAG	X	CGAA	AUAAGCGG	318	CGCTTATT	C	TGCTCCCT	846
2111	AUAACAGG	CUGAUGAG	X	CGAA	AGCAGAAU	319	ATTCTGCT	C	CTGTATT	847
2117	UAGCAGAU	CUGAUGAG	X	CGAA	ACAGGGAG	320	CTCCCTGT	T	ATCTGCTA	848
2118	CUAGCAGA	CUGAUGAG	X	CGAA	AACAGGGA	321	TCCCTGTT	A	TCTGCTAG	849
2120	AUCUAGCA	CUGAUGAG	X	CGAA	AUAACAGG	322	CCTGTTAT	C	TGCTAGAT	850
2125	ACUAGAU	CUGAUGAG	X	CGAA	AGCAGAAU	323	TATCTGCT	A	GATCTAGT	851
2129	GAGAACUA	CUGAUGAG	X	CGAA	AUCUAGCA	324	TGCTAGAT	C	TAGTTCTC	852
2131	UUGAGAAC	CUGAUGAG	X	CGAA	AGAUUAG	325	CTAGATCT	A	GTTCTCAA	853
2134	UGAUUGAG	CUGAUGAG	X	CGAA	ACUAGAU	326	GATCTAGT	T	CTCAATCA	854

Table 3

2135	GUGAUUGA	CUGAUGAG	X	CGAA	AACUAGAU	327	ATCTAGTT	C	TCAATCAC	855
2137	CAGUGAUU	CUGAUGAG	X	CGAA	AGAACUAG	328	CTAGTTCT	C	AATCACTG	856
2141	GGAGCAGU	CUGAUGAG	X	CGAA	AUUGAGAA	329	TTCTCAAT	C	ACTGCTCC	857
2148	ACACGGGG	CUGAUGAG	X	CGAA	AGCAGUGA	330	TCAGTCTC	C	CCCCGTGT	858
2159	CAUUCUAA	CUGAUGAG	X	CGAA	ACACACGG	331	CCGTGTGT	A	TTAGAAATG	859
2161	UGCAUUCU	CUGAUGAG	X	CGAA	AUACACAC	332	GTGTGTAT	T	AGAATGCA	860
2162	AUGCAUUC	CUGAUGAG	X	CGAA	AUACACAC	333	TGTGTATT	A	AGATGCAT	861
2173	GAAGACCU	CUGAUGAG	X	CGAA	ACAUGCAU	334	ATGCATGT	A	GGTCTTTC	862
2178	CACAAGAA	CUGAUGAG	X	CGAA	ACCUUACA	335	TGTAAGGT	C	TTCTTGTG	863
2180	GACACAAG	CUGAUGAG	X	CGAA	AGACCUUA	336	TAAGGTCT	T	CTTGTGTC	864
2181	GGACACAA	CUGAUGAG	X	CGAA	AAGACCUU	337	AAGGTCTT	C	TTGTGTCC	865
2183	CAGGACAC	CUGAUGAG	X	CGAA	AGAAGACC	338	GGTCTTCT	T	GTGTCTGT	866
2188	UUCACUAG	CUGAUGAG	X	CGAA	ACACAAGA	339	TCTTGTGT	C	CTGATGAA	867
2201	CAAGCACA	CUGAUGAG	X	CGAA	AUUIUUCA	340	TGAAAAAT	A	TGTGCTTG	868
2208	CUCAUUCU	CUGAUGAG	X	CGAA	AGCACAUU	341	TATGTGCT	T	GAATGAGG	869
2222	AGAGAUCA	CUGAUGAG	X	CGAA	AGUUCUCU	342	GAGAAACT	T	TGATCTCT	870
2223	CAGAGAUU	CUGAUGAG	X	CGAA	AAGUUCUU	343	AGAAACTT	T	GATCTCTG	871
2227	UAAGCAGA	CUGAUGAG	X	CGAA	AUCAAGUU	344	ACTTTGAT	C	TCTGCTTA	872
2229	AGUAAGCA	CUGAUGAG	X	CGAA	AGAUCAAA	345	TTGTGATC	A	ATGTGCTT	873
2234	ACAUUAGU	CUGAUGAG	X	CGAA	AGCAGAGA	346	TCTCTGCT	T	ACTAATGT	874
2235	CACAUUAG	CUGAUGAG	X	CGAA	AAGCAGAG	347	CTCTGCTT	A	CTAATGTG	875
2238	GGGCACAU	CUGAUGAG	X	CGAA	AGUAAGCA	348	TGCTTACT	A	ATGTGCCC	876
2252	UGGACUUG	CUGAUGAG	X	CGAA	ACAUGGGG	349	CCCCATGT	C	CAAGTCCA	877
2258	GCAGGUUG	CUGAUGAG	X	CGAA	ACUUGGAC	350	GTCCAAGT	C	CAACCTGC	878
2283	CAUGUAAU	CUGAUGAG	X	CGAA	AUCAGGUC	351	GACCTGAT	C	ATTACATG	879
2286	AGCCAUGU	CUGAUGAG	X	CGAA	AUGAUCAU	352	CTGATCAT	T	ACATGGCT	880
2287	CAGCCAUG	CUGAUGAG	X	CGAA	AUUAUJCA	353	TGATCATT	A	CATGGCTG	881
2300	GGCUUAGG	CUGAUGAG	X	CGAA	ACCACAGC	354	GCTGTGGT	T	CCTAAGCC	882
2301	AGGCUUAG	CUGAUGAG	X	CGAA	AACCACAG	355	CTGTGGTT	C	CTAAGCCT	883
2304	AACAGGCU	CUGAUGAG	X	CGAA	AGGAACCA	356	TGGTTCCCT	A	AGCCTGTT	884
2312	ACUUCAGC	CUGAUGAG	X	CGAA	ACAGGCUU	357	AAGCCTGT	T	GCTGAAGT	885
2321	GGCAGCAU	CUGAUGAG	X	CGAA	ACUUCAGC	358	GCTGAAGT	C	ATTGTCCG	886
2324	UGAGCGAC	CUGAUGAG	X	CGAA	AUGACUUC	359	GAAGTCAT	T	GTCTGCTA	887
2327	UGCUGAGC	CUGAUGAG	X	CGAA	ACAAUGAC	360	GTCTTGTG	C	GCTCAGCA	888
2331	CUAUUGCU	CUGAUGAG	X	CGAA	AGCGACAA	361	TTGTGCTC	C	AGCAATAG	889
2338	CUGCACCC	CUGAUGAG	X	CGAA	AUUGCUGA	362	TCAGCAAT	A	GAGTGCAG	890
2348	UCCUGGAA	CUGAUGAG	X	CGAA	ACUGCACCC	363	GGTGCAGT	T	TTCCAGGA	891
2349	UUCUUGGA	CUGAUGAG	X	CGAA	AACUGCAC	364	GTGCAGTT	T	TCCAGGAA	892
2350	AUUCUUGG	CUGAUGAG	X	CGAA	AAACUGCA	365	TGCAGTTT	T	CCAGGAAT	893
2351	UAUUCUUG	CUGAUGAG	X	CGAA	AAAACUGC	366	GCAGTTTT	C	CAGGAATA	894
2359	CAAUUGCC	CUGAUGAG	X	CGAA	AUUCUUGG	367	CCAGGAAT	A	GGCATTGT	895
2365	AUUAGGCA	CUGAUGAG	X	CGAA	AGGCUUUA	368	ATAGGCAAT	T	TGCTTAAT	896
2366	AUUAGGCA	CUGAUGAG	X	CGAA	AUUGCCUA	369	TAGGCATT	T	GCCTAATT	897
2371	CCAGGAAU	CUGAUGAG	X	CGAA	AGGCAAAU	370	ATTTGCCT	A	ATTCCTGG	898
2374	AUGCCAGG	CUGAUGAG	X	CGAA	AUUAGGCA	371	TGCTTAAT	T	CCTGGCAT	899
2375	CAUGCCAG	CUGAUGAG	X	CGAA	AUUUAGGC	372	GCCTAATT	C	CTGGCATG	900
2389	AGUCACUA	CUGAUGAG	X	CGAA	AGUGUUAU	373	ATGACACT	C	TAGTGACT	901

Table 3

2391	GAAGUCAC	CUGAUGAG	X	CGAA	AGAGUGUC	374	GACACTCT	A	GTGACTTC	902
2398	UCACCAGG	CUGAUGAG	X	CGAA	AGUACUA	375	TAGTACTT	T	CCTGGTGA	903
2399	CUACCAGG	CUGAUGAG	X	CGAA	AGUACUA	376	AGTGACTT	C	CTGGTAGG	904
2419	UGUACAG	CUGAUGAG	X	CGAA	ACAGGCUG	377	CAGCCTGT	C	CTGGTACA	905
2425	CCUGGUG	CUGAUGAG	X	CGAA	ACCAGGAC	378	GTCTGTGT	A	CAGCAGGG	906
2435	UACAGCAA	CUGAUGAG	X	CGAA	ACCCUGCU	379	AGCAGGGT	C	TTGCTGTA	907
2437	GUUACAGC	CUGAUGAG	X	CGAA	AGACCCUG	380	CAGGGTCT	T	GCTGTAAC	908
2443	GUCUGAGU	CUGAUGAG	X	CGAA	ACAGCAAG	381	CTTGCTGT	A	ACTCAGAC	909
2447	GAAGUCU	CUGAUGAG	X	CGAA	AGUACAG	382	CTGTAATC	C	AGACATTC	910
2454	ACCCUUGG	CUGAUGAG	X	CGAA	AUGUCUGA	383	TCAGACAT	T	CCAAGGGT	911
2455	UACCCUUG	CUGAUGAG	X	CGAA	AUGUCUG	384	CAGACATT	C	CAAGGGTA	912
2463	GCUCUCCA	CUGAUGAG	X	CGAA	ACCCUUGG	385	CCAAGGGT	A	TGGGAAGC	913
2475	GGUGUGAA	CUGAUGAG	X	CGAA	AUGGCUUC	386	GAAGCCAT	A	TTACACCC	914
2477	GAGGUGUG	CUGAUGAG	X	CGAA	AUAGGCU	387	AGCCATAT	T	CACACCTC	915
2478	UGAGGUGU	CUGAUGAG	X	CGAA	AUUAUGGC	388	GCCATATT	C	ACACCTCA	916
2485	CAGAGCGU	CUGAUGAG	X	CGAA	AGGUGUGA	389	TCACACCT	C	ACGCTCTG	917
2491	CAUGUCCA	CUGAUGAG	X	CGAA	AGCGUGAG	390	CTCAGCCT	C	TGACATG	918
2502	CUUCCCUA	CUGAUGAG	X	CGAA	AUCAUGC	391	GACATGAT	T	TAGGGAAG	919
2503	GCUCUCCU	CUGAUGAG	X	CGAA	AAUCAUGU	392	ACATGATT	T	AGGGAAGC	920
2504	UGUCUCCC	CUGAUGAG	X	CGAA	AAUCAUG	393	CATGATT	A	GGGAAGCA	921
2536	UGAUCCCA	CUGAUGAG	X	CGAA	AGGUGGG	394	CCCCACCT	T	TGGGATCA	922
2537	CGAUUCCC	CUGAUGAG	X	CGAA	AGGUGGG	395	CCCCCTT	T	GGGATCAG	923
2543	CGAGGCGU	CUGAUGAG	X	CGAA	AUCCCAAA	396	TTTGGGAT	C	AGCCTCCG	924
2549	GAUUGGCG	CUGAUGAG	X	CGAA	AGGCGUAG	397	ATCAGCCT	C	CGCATTC	925
2556	CGACUUGG	CUGAUGAG	X	CGAA	AUGGCGGA	398	TCCGCCAT	T	CCAAGTCG	926
2557	UGGACUUG	CUGAUGAG	X	CGAA	AUUGGCGG	399	CCGCCATT	C	CAAGTCGA	927
2563	AGAGUGUC	CUGAUGAG	X	CGAA	ACUUGGAA	400	TTCCAAGT	C	GACACTCT	928
2570	CUCAAGAA	CUGAUGAG	X	CGAA	AGUGUGCA	401	TCGACACT	C	TCTTTAGG	929
2572	UGUCUCAA	CUGAUGAG	X	CGAA	AGAGUGUC	402	GACACTCT	T	CTTGAGCA	930
2573	CUCUCUAA	CUGAUGAG	X	CGAA	AAGAGUGU	403	ACACTCTT	C	TTGACGAG	931
2575	GUCUGCUC	CUGAUGAG	X	CGAA	AGAAGAGU	404	ACTCTTCT	T	GAGCAGAC	932
2590	CGUCUCCA	CUGAUGAG	X	CGAA	AUCACGGU	405	ACCGTGAT	T	TGGAAGAG	933
2591	UCUCUJCC	CUGAUGAG	X	CGAA	AUACCGG	406	CCGTGATT	T	GGAAGAGA	934
2622	GUUUAAG	CUGAUGAG	X	CGAA	AGUGUGGU	407	ACCACACT	T	CTTGAAC	935
2623	UGUUAUAA	CUGAUGAG	X	CGAA	AGUGUGGG	408	CCACACTT	C	TTGAACA	936
2625	GGUJUUCU	CUGAUGAG	X	CGAA	AGAAGUGU	409	ACACTTCT	T	GAAACAGC	937
2646	GCUAUAG	CUGAUGAG	X	CGAA	ACCGUCAC	410	GTGACGCT	C	CTTTAGGC	938
2649	GCUGCCUA	CUGAUGAG	X	CGAA	AGGACCGU	411	ACGGTCTT	T	TAGGCAGC	939
2650	GGCUGCCU	CUGAUGAG	X	CGAA	AAGGACCG	412	CGGTCTCT	T	AGGCAGCC	940
2651	AGCUGGCC	CUGAUGAG	X	CGAA	AAAGGACC	413	GGTCTTTT	A	GGCAGCCT	941
2668	GGGACAGA	CUGAUGAG	X	CGAA	ACGGCGGC	414	GCGCGCCT	C	TCTGTCCC	942
2670	CCGGGACA	CUGAUGAG	X	CGAA	AGACGGCG	415	CGCGGTCT	C	TGTCCGGG	943
2674	UGAACCGG	CUGAUGAG	X	CGAA	ACAGAGAC	416	GTCTCTGT	C	CCGGTTCA	944
2680	GCAAGGUG	CUGAUGAG	X	CGAA	ACCGGGAC	417	GTCCCGGT	T	CACCTTGC	945
2681	GGCAAGGU	CUGAUGAG	X	CGAA	AACCGGGA	418	TCCCGGTT	C	ACCTTTGC	946
2686	CUCUCGGC	CUGAUGAG	X	CGAA	AGGUGAAC	419	GTTCACCT	T	GCCGAGAG	947
2703	GUGGGGCA	CUGAUGAG	X	CGAA	ACGGCCCU	420	AGCGCGCT	C	TGCCCCAC	948

Table 3

2715	CAGGGUUU	CUGAUGAG	X	CGAA	AGGGUGGG	421	CCCACCCCT	C	AAACCCCTG	949
2741	AGAGUCGU	CUGAUGAG	X	CGAA	AGCACCAU	422	ATGGTGCT	C	AGACTCT	950
2748	UGCAGGAA	CUGAUGAG	X	CGAA	AGUCGUGA	423	TCACGACT	C	TTCTGCA	951
2750	UUUGCAGG	CUGAUGAG	X	CGAA	AGAGUCGU	424	ACGACTCT	T	CCTGCAAA	952
2751	CUUUGCAG	CUGAUGAG	X	CGAA	AAGAGUCG	425	CGACTCTT	C	CTGCAAG	953
2774	UUAUUGUG	CUGAUGAG	X	CGAA	AGGUUCUC	426	GAAGACCT	C	CACATTA	954
2780	AGCCACUU	CUGAUGAG	X	CGAA	AUGUGGAG	427	CTCCACAT	T	AGTGGCT	955
2781	AAGCCACU	CUGAUGAG	X	CGAA	AUGUGGGA	428	TCACATT	A	AGTGGCTT	956
2789	AUGUUA	CUGAUGAG	X	CGAA	AGCCACUU	429	AAGTGCTT	T	TTTAACAT	957
2790	CAUGUUA	CUGAUGAG	X	CGAA	AAGCCACU	430	AGTGCTT	T	TTAACATG	958
2791	UCAUGUUA	CUGAUGAG	X	CGAA	AAAGCCAC	431	GTGCTTT	T	TAACATGA	959
2792	UUCAUGUU	CUGAUGAG	X	CGAA	AAAAGCCA	432	TGCTTTT	T	AACATGAA	960
2793	UUUCAUGU	CUGAUGAG	X	CGAA	AAAAGGCC	433	GGCTTTT	A	ACATGAAA	961
2816	UCGGGAGC	CUGAUGAG	X	CGAA	ACAGUCGC	434	GCAGCTGT	A	GCTCCCGA	962
2820	UAGCUCGG	CUGAUGAG	X	CGAA	AGCUACAG	435	CTGTAGCT	C	CCGAGCTA	963
2828	CAAGAGAG	CUGAUGAG	X	CGAA	AGCUCGGG	436	CCGAGCT	A	CTCTCTTG	964
2831	UGGCAAGA	CUGAUGAG	X	CGAA	AGUAGCUC	437	GAGCTACT	C	TCTTGCCA	965
2833	GCUGGCAG	CUGAUGAG	X	CGAA	AGAGUAGC	438	GCTACTCT	C	TGCGCAG	966
2835	AUGCUGGC	CUGAUGAG	X	CGAA	AGAGAGUA	439	TACTCTCT	T	GCCAGCAT	967
2844	AAUGUGAA	CUGAUGAG	X	CGAA	AUGCUGGC	440	GCCAGCAT	T	TTACATT	968
2845	AAUUGUGA	CUGAUGAG	X	CGAA	AAUGCUGG	441	CCAGCATT	T	TCACATT	969
2846	AAAUGUGU	CUGAUGAG	X	CGAA	AAUUGCUG	442	CAGCATT	T	CACATTTT	970
2847	CAAAUGU	CUGAUGAG	X	CGAA	AAAAGUCU	443	AGCATT	T	ACATTTTG	971
2852	AAAGGCAA	CUGAUGAG	X	CGAA	AUGUGAAA	444	TTTCACAT	T	TTGCTTT	972
2853	GAAAGCCA	CUGAUGAG	X	CGAA	AAUGUGAA	445	TTACATT	T	TGCTTTT	973
2854	AGAAAGGC	CUGAUGAG	X	CGAA	AAUUGUGA	446	TCACATT	T	GCCTTTCT	974
2859	CCACGAGA	CUGAUGAG	X	CGAA	AGGCAAAA	447	TTTTGCTT	T	TCTGTTGG	975
2860	ACCACGAG	CUGAUGAG	X	CGAA	AAGGCAAA	448	TTTGCTT	T	CTGTTGGT	976
2861	UACCACGA	CUGAUGAG	X	CGAA	AAAGGCAA	449	TTGCTTT	C	TGTTGGTA	977
2863	UCUACCAC	CUGAUGAG	X	CGAA	AGAAAGGC	450	GCCTTTCT	C	GTGTTAGA	978
2869	CUGGCUUC	CUGAUGAG	X	CGAA	ACCACGAG	451	CTGTTGGT	A	GAAGCCAG	979
2879	UUUCUCUG	CUGAUGAG	X	CGAA	ACUGGCUU	452	AAGCCAAT	A	CAGAGAAA	980
2889	CACCACAG	CUGAUGAG	X	CGAA	AUUUCUCU	453	AGAGAAAT	T	CTGTGGTG	981
2890	CCACCACA	CUGAUGAG	X	CGAA	AAUUCUC	454	GAGAAAT	C	TGTTGGTG	982
2905	ACACCUCG	CUGAUGAG	X	CGAA	AUGUCCCC	455	GGGACAT	T	CGAGTGT	983
2906	GACACUC	CUGAUGAG	X	CGAA	AAUUGUCC	456	GGACATT	C	GAGGTGTC	984
2914	UGCAGGGU	CUGAUGAG	X	CGAA	ACACCUCG	457	CGAGTGT	C	ACCTTGCA	985
2928	CCUACCA	CUGAUGAG	X	CGAA	AGCUCUCG	458	GCAGACT	A	TGTTGAGG	986
2944	CUAAGCCU	CUGAUGAG	X	CGAA	AUCCACAC	459	GTGTGAT	A	AGGCTTAG	987
2950	UGGCACCU	CUGAUGAG	X	CGAA	AGCCUUUU	460	ATAAGCCT	T	AGTGCCA	988
2951	CUGGCACC	CUGAUGAG	X	CGAA	AAGCCUUA	461	TAAGGCTT	A	GTTGCGAG	989
2965	AGAAUGCU	CUGAUGAG	X	CGAA	ACAGCCUG	462	CAGGCTGT	A	AGCATTT	990
2971	CAGCUCAG	CUGAUGAG	X	CGAA	AUCCUJAC	463	GTAAOCAT	T	CTGAGCTG	991
2972	CCAGCUGA	CUGAUGAG	X	CGAA	AUUGCUUA	464	TAAGCATT	C	TGAGCTGG	992
2983	AAAACAAC	CUGAUGAG	X	CGAA	AGCCAGCU	465	AGCTGGCT	T	GTGTTTT	993
2986	UUAAAAAC	CUGAUGAG	X	CGAA	ACAAGCCA	466	TGCTTGT	T	GTTTTTAA	994
2989	GACUUA	CUGAUGAG	X	CGAA	ACAACAAG	467	CTTGTGT	T	TTTAAGTC	995

Table 3

2990	GGACUUA	CUGAUGAG	X	CGAA	AACAACAA	468	TTGTTGTT	T	TTAAGTCC	996
2991	AGGACUUA	CUGAUGAG	X	CGAA	AAACAACA	469	TGTTGTTT	T	TAAGTCCT	997
2992	CAGGACUU	CUGAUGAG	X	CGAA	AAAACAAC	470	GTTGTTTT	T	AAGTCCTG	998
2993	ACAGGACU	CUGAUGAG	X	CGAA	AAAAACAA	471	TTGTTTTT	A	AGTCCTGT	999
2997	AUAUACAG	CUGAUGAG	X	CGAA	ACUUAUAA	472	TTTTAAGT	C	CTGTATAT	1000
3002	CAUACAU	CUGAUGAG	X	CGAA	ACAGGACU	473	AGTCCTGT	A	TATGTATG	1001
3004	UAUAUACA	CUGAUGAG	X	CGAA	AUACAGGA	474	TCCTGTAT	A	TGTATGTA	1002
3008	CUACUACA	CUGAUGAG	X	CGAA	ACAUUAUC	475	GTATATGT	A	TGTAGTAG	1003
3012	CAACUAC	CUGAUGAG	X	CGAA	ACAUACAU	476	ATGTATGT	A	GTAGTTTG	1004
3015	ACCCAAAC	CUGAUGAG	X	CGAA	ACUACAU	477	TATGTAGT	A	GTTTGGGT	1005
3018	CACACCCA	CUGAUGAG	X	CGAA	ACUACUAC	478	GTAGTAGT	T	TGGGTGTG	1006
3019	ACACACCC	CUGAUGAG	X	CGAA	ACUACUAC	479	TAGTAGIT	T	GGGTGTGT	1007
3028	ACUAUAUA	CUGAUGAG	X	CGAA	ACACACCC	480	GGGTGTGT	A	TATATAGT	1008
3030	CUACUUA	CUGAUGAG	X	CGAA	AUACACAC	481	GTGTGTAT	A	TATAGTAG	1009
3032	UGCUACUA	CUGAUGAG	X	CGAA	AUAUACAC	482	GTGTATAT	A	TAGTAGCA	1010
3034	AUUGCUAC	CUGAUGAG	X	CGAA	AUAUAUAC	483	GTATATGT	A	GTAGCATT	1011
3037	UGAAUUGC	CUGAUGAG	X	CGAA	ACUAUAUA	484	TATATAGT	A	GCATTCCA	1012
3042	CAUUUGA	CUGAUGAG	X	CGAA	AUGCUACU	485	AGTAGCAT	T	TCAAAATG	1013
3043	CAUUUUUG	CUGAUGAG	X	CGAA	AUUGCUAC	486	GTAGCATT	T	CAAAATGG	1014
3044	UCCAUUUU	CUGAUGAG	X	CGAA	AUUGCUA	487	TAGCATTT	C	AAATGGGA	1015
3056	UAAACCAG	CUGAUGAG	X	CGAA	ACGUCCAU	488	ATGGACGT	A	CTGGTTTA	1016
3062	GGAGGUUA	CUGAUGAG	X	CGAA	ACCAGUAC	489	GTACTGGT	T	TAACCTCC	1017
3063	AGGAGGUU	CUGAUGAG	X	CGAA	AACCAGUA	490	TACTGGTT	T	AACCTCCT	1018
3064	UAGGAGGU	CUGAUGAG	X	CGAA	AAACCAGU	491	ACTGGTTT	A	ACCTCCTA	1019
3069	AAGGAUAG	CUGAUGAG	X	CGAA	AGGUUAUA	492	TTTAAACCT	C	CTATCCTT	1020
3072	UCCAAGGA	CUGAUGAG	X	CGAA	AGGAGGUU	493	AACCTCCT	A	TCCTGGGA	1021
3074	UCUCCAAG	CUGAUGAG	X	CGAA	AUAGGAGG	494	CCTCCTAT	C	CTTGGAGA	1022
3077	UGUCUCUC	CUGAUGAG	X	CGAA	AGGAUAGG	495	CCTATCCT	T	GGAGAGCA	1023
3093	AAGUGUGA	CUGAUGAG	X	CGAA	AGCCAGCU	496	AGCTGGCT	C	TCCACCTT	1024
3095	ACAAGGUG	CUGAUGAG	X	CGAA	AGAGCCAG	497	CTGGCTCT	C	CACCTTGT	1025
3101	UGUGUAAC	CUGAUGAG	X	CGAA	AGGUGGAG	498	CTCCACCT	T	GTTACACA	1026
3104	UAUUGUGU	CUGAUGAG	X	CGAA	ACAAGGUG	499	CACCTTGT	T	ACACATTA	1027
3105	AUAUUGUG	CUGAUGAG	X	CGAA	AACAAGGU	500	ACCTTGGT	A	CACATTAT	1028
3111	UCUAACAU	CUGAUGAG	X	CGAA	AUGUGUAA	501	TTACACAT	T	ATOTTAGA	1029
3112	CUCUACA	CUGAUGAG	X	CGAA	AUUGUGUA	502	TACACATT	A	TGTTAGAG	1030
3116	ACCUCUCU	CUGAUGAG	X	CGAA	ACAUAUAG	503	CATTATGT	T	AGAGAGGT	1031
3117	UACCUCUC	CUGAUGAG	X	CGAA	AACAUAUU	504	ATTATGTT	A	GAGAGGTA	1032
3125	CACUCUCG	CUGAUGAG	X	CGAA	ACCUCUCU	505	AGAGAGGT	A	GGAGGCTG	1033
3136	ACUAAGCA	CUGAUGAG	X	CGAA	AGCAGCUC	506	GAGCTGCT	C	TGCTATGT	1034
3141	UAAGGACA	CUGAUGAG	X	CGAA	AGCAGAGC	507	GCCTGCT	A	TGCTCTTA	1035
3145	GGCUUAAG	CUGAUGAG	X	CGAA	ACUAAGCA	508	TGCTATGT	C	CTTAAGCC	1036
3148	AUUGGCUU	CUGAUGAG	X	CGAA	AGGACAU	509	TATGTCCT	T	AAGCCAAT	1037
3149	UAUUGGCU	CUGAUGAG	X	CGAA	AAGGACAU	510	ATGTCCTT	A	AGCCAATA	1038
3157	UGAGUAAA	CUGAUGAG	X	CGAA	AUUGGCUU	511	AAGCCAAT	A	TTTACTCA	1039
3159	GAUGAGUA	CUGAUGAG	X	CGAA	AUAUUGG	512	GCCAATAT	T	TACTCATC	1040
3160	UGAUGAGU	CUGAUGAG	X	CGAA	AUAUUGG	513	CCAATATT	T	ACTCATCA	1041
3161	CUGAUGAG	CUGAUGAG	X	CGAA	AAUAUUG	514	CAATATTT	A	CTCATCAG	1042

Table 3

3164	GACCUGAU	CUGAUGAG	X	CGAA	AGUAAAUA	515	TATTTACT	C	ATCAGGTC	1043
3167	AAUGACCU	CUGAUGAG	X	CGAA	AUGAGUAA	516	TTACTCAT	C	AGGTCATT	1044
3172	AAAAUAAU	CUGAUGAG	X	CGAA	ACCUGAUG	517	CATCAGGT	C	ATTATTTT	1045
3175	UAAAAAAU	CUGAUGAG	X	CGAA	AUGACCUU	518	CAGGTCAT	T	ATTTTTTA	1046
3176	GUAAAAAA	CUGAUGAG	X	CGAA	AAUGACCU	519	AGGTCATT	A	TTTTTTAC	1047
3178	UUGUAAAA	CUGAUGAG	X	CGAA	AUAUAGAC	520	GTCAATTAT	T	TTTTACAA	1048
3179	AUUGUAAA	CUGAUGAG	X	CGAA	AAUAAUGA	521	TCATTATT	T	TTTACAAT	1049
3180	CAUUGUAA	CUGAUGAG	X	CGAA	AAAUAAUG	522	CATTATT	T	TTACAATG	1050
3181	CCAUUGUA	CUGAUGAG	X	CGAA	AAAAUAAU	523	ATTATTTT	T	TACAATGG	1051
3182	GCCAUUGU	CUGAUGAG	X	CGAA	AAAAAUAA	524	TTATTTTT	T	ACAATGGC	1052
3183	GGCAUUGU	CUGAUGAG	X	CGAA	AAAAAUAA	525	TATTTTTT	A	CAATGGCC	1053
3199	AAAUUGUU	CUGAUGAG	X	CGAA	AUUCCAUG	526	CATGGAAT	A	AACCATTT	1054
3206	UUUGUAAA	CUGAUGAG	X	CGAA	AUGGUUUA	527	TAAACCAT	T	TTTACAAA	1055
3207	UUUUUAAA	CUGAUGAG	X	CGAA	AAUGGUUU	528	AAACCAT	T	TTACAAA	1056

Input Sequence = PTPN1 (Homo sapiens protein tyrosine phosphatase, non-receptor type 1 (PTPN1)
3215 bp)

Cut Site = UH.

Table 4

Table 4: Human PTP-1B NCH Ribozyme and Target Sequence

Nt. Position	Ribozyme Sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
13	CCGCUA CUGAUGAG X CGAA ICOCGUC	1057	GACGCGGC C TAGAGCGG	1781
14	GCCGCU CUGAUGAG X CGAA ICOCGUC	1058	ACGCGGCC T AGAGCGGC	1782
23	GCGCCGUC CUGAUGAG X CGAA ICOCGUC	1059	AGAGCGGC A GACGCGGC	1783
32	CGGCCAC CUGAUGAG X CGAA ICOCGUC	1060	GACGCGGC A GTGGCCG	1784
39	UCUUCUC CUGAUGAG X CGAA ICCACUG	1061	CAGTGGC C GAGAAGGA	1785
53	GCGCGUC CUGAUGAG X CGAA ICOCGUC	1062	GGAGCGC A GCAGCGC	1786
56	AGGGCGGC CUGAUGAG X CGAA ICUGGCG	1063	GGCGCAGC A GCGCCCT	1787
59	GCCAGGCG CUGAUGAG X CGAA ICUGGCG	1064	GCAGCAGC C GCCCTGC	1788
62	CGGGCCAG CUGAUGAG X CGAA ICOCGUC	1065	GCAGCGC C CTGGCCG	1789
63	ACGGGCCA CUGAUGAG X CGAA ICOCGUC	1066	CAGCGGCC C TGGCCGT	1790
64	GACGGGCC CUGAUGAG X CGAA IGCGGCG	1067	AGCGGCC T GCGCCGT	1791
68	CCAUGACG CUGAUGAG X CGAA ICCAGGC	1068	GCCCTGGC C CCGCATGG	1792
69	UCCAUGAC CUGAUGAG X CGAA IGCGAGG	1069	CCCTGGC C GTCATGGA	1793
73	CAUCUCCA CUGAUGAG X CGAA IACGGGC	1070	GGCCGTC A TGGAGATG	1794
98	UGUGAUC CUGAUGAG X CGAA ICUGAAC	1071	GTTCGAGC A GATGACA	1795
106	CCGGGACU CUGAUGAG X CGAA TUGAUCU	1072	AGATGAC A AGTCCGG	1796
111	CAGCUCGC CUGAUGAG X CGAA IACUGGC	1073	GACAAATC C GGGAGCTG	1797
118	GCCGCGCC CUGAUGAG X CGAA ICUCGCG	1074	CCGGGAGC T GGGCGCC	1798
126	UGUAAAU CUGAUGAG X CGAA ICOCGCCA	1075	TGGCGGC C ATTTACCA	1799
127	CUGGUAU CUGAUGAG X CGAA ICOCGCC	1076	GGCGGCC A TTTACAG	1800
133	GAUAUCCU CUGAUGAG X CGAA TUAUAUG	1077	CCATTAC C AGGATATC	1801
134	GGUAUCC CUGAUGAG X CGAA IGUAUAUG	1078	CATTAC C GGATATCC	1802
142	UUAUUGC CUGAUGAG X CGAA TUAUAUCU	1079	AGGATATC C GACATGAA	1803
146	UGGCUCA CUGAUGAG X CGAA TUGGAUA	1080	TATCCGAC A TGAAGCA	1804
153	AAGUCACU CUGAUGAG X CGAA ICUCUAG	1081	CATGAAGC C AGTAGATT	1805
154	GAAGUCAC CUGAUGAG X CGAA ICUCUAG	1082	ATGAAGCC A GTGACTT	1806
160	ACAUGGGA CUGAUGAG X CGAA IUCACUG	1083	CCAGTGAC T TCCATGT	1807
163	UCUACAU CUGAUGAG X CGAA TAAGUCAC	1084	GTGACTT C CATGTAGA	1808
164	CUCUACAU CUGAUGAG X CGAA IGAAGUCA	1085	TGACTTCC C ATGTAGAG	1809
165	ACUCUACA CUGAUGAG X CGAA IGGAAUGC	1086	GACTTCCC A TGTAGAT	1810
177	GAAGCUU CUGAUGAG X CGAA ICCACUCU	1087	AGAGTGGC C AAGCTTCC	1811
178	AGGAAGCU CUGAUGAG X CGAA IGCCACUC	1088	GAGTGGC A AGCTTCT	1812
182	UCUUAAGA CUGAUGAG X CGAA ICUGGCC	1089	GGCAAGC T TCCTAAGA	1813
185	UGUUCUA CUGAUGAG X CGAA IAAAGCUG	1090	CAAGCTT C TAAGAACA	1814
186	UGUUCUU CUGAUGAG X CGAA IGAAGCUU	1091	AAGCTTCC T AAGAACA	1815
193	UGGUUUU CUGAUGAG X CGAA IUUCUAG	1092	CTAAGAAC A AAAACCA	1816
199	CCUAUUUC CUGAUGAG X CGAA IUUUUUGU	1093	ACAAAAC C GAAATAGG	1817
211	GACGUCUC CUGAUGAG X CGAA IUACUUA	1094	ATAGGTAC A GAGCGTC	1818
220	AAAGGGAC CUGAUGAG X CGAA IACGUCUC	1095	GAGACGTC A GTCCCTTT	1819
224	GGUCAAG CUGAUGAG X CGAA IACGACG	1096	CGTACGTC C CTTTGACC	1820
225	UGGUCAA CUGAUGAG X CGAA IGACUGAC	1097	GTCACTCC C TTTGACCA	1821
226	AUGGUCAA CUGAUGAG X CGAA IGGACUGA	1098	TCACTCCC T TTGACCAT	1822
232	CCGACUAU CUGAUGAG X CGAA IUCAAAGG	1099	CCTTTGAC C ATAGTCG	1823

Table 4

233	UCCGACUA	CUGAUGAG	X	CGAA	IGUCAAG	1100	CTTTGACC	A	TAGTCGGA	1824
248	CUUGAUGU	CUGAUGAG	X	CGAA	IUUUAUUC	1101	GATTAAAC	T	ACATCAAG	1825
251	CUUCUUGA	CUGAUGAG	X	CGAA	IUAUGUUA	1102	TAAACTAC	A	TCAAGAAG	1826
254	UAUCUUCU	CUGAUGAG	X	CGAA	IUAUGUAG	1103	ACTACATC	A	AGAAGATA	1827
268	GUUGAUAU	CUGAUGAG	X	CGAA	IUCAUUAU	1104	ATAAAGAC	T	ATATCAAC	1828
274	ACUAGCGU	CUGAUGAG	X	CGAA	IUAUUAAG	1105	ACTATATC	A	ACGCTAGT	1829
279	AUCAAAAU	CUGAUGAG	X	CGAA	ICGUUGAU	1106	ATCAACGC	T	AGTTTGAT	1830
303	CUCUUCU	CUGAUGAG	X	CGAA	ICUUCUUC	1107	GAAGAAGC	C	CRAAGGAG	1831
304	ACUCCUUU	CUGAUGAG	X	CGAA	IGCUUCUU	1108	AAGAAGCC	C	AAAGGAGT	1832
305	AACUCCUU	CUGAUGAG	X	CGAA	IGGCUUCU	1109	AGAAGGCC	A	AAGGAGTT	1833
316	GGUUAAGA	CUGAUGAG	X	CGAA	IUAACUCC	1110	GGAGTTAC	A	TTCTTACC	1834
320	CCUGGGUA	CUGAUGAG	X	CGAA	IUAUGUAA	1111	TTACATTC	T	TACCCAGG	1835
324	GGGCCUUG	CUGAUGAG	X	CGAA	IUAAGAAU	1112	ATTCTTAC	C	CAGGGCCC	1836
325	AGGGCCCU	CUGAUGAG	X	CGAA	IGUAAGAA	1113	TTCTTACC	C	AGGGCCCT	1837
326	AAGGGCCC	CUGAUGAG	X	CGAA	IGGUAAGA	1114	TCTTACCC	A	GGGCCCTT	1838
331	AGGCAAGG	CUGAUGAG	X	CGAA	ICCCUIGG	1115	CCGAGGCC	C	CTTTGGCT	1839
332	UAGGCAAA	CUGAUGAG	X	CGAA	IGCCCUUG	1116	CCAGGGCC	C	TTTGCCCTA	1840
333	UUAAGCAA	CUGAUGAG	X	CGAA	IGGCCUUG	1117	CAGGGCCC	T	TTGCTTAA	1841
338	AUGUGUUA	CUGAUGAG	X	CGAA	ICAAAGGG	1118	CCCTTTGC	C	TAAACATC	1842
339	CAUGUGUU	CUGAUGAG	X	CGAA	IGCAAAGG	1119	CCCTTTGC	T	AACACATG	1843
343	ACCGCAUG	CUGAUGAG	X	CGAA	IUAAGGCA	1120	TGCTTAAC	A	CATGCGGT	1844
345	UGACCCGA	CUGAUGAG	X	CGAA	IUGUUUAG	1121	CCTTAACAC	A	TGCGGTCA	1845
353	CCCAAAAG	CUGAUGAG	X	CGAA	IACCGCAU	1122	ATGCGGTC	A	CTTTTGGG	1846
355	CUCCCAAA	CUGAUGAG	X	CGAA	IUGACCGC	1123	GCGGTAC	T	TTTGGGAG	1847
377	UGCUUUUC	CUGAUGAG	X	CGAA	ICUCCAC	1124	GTGGGAGC	A	GAAGAAGCA	1848
385	GACACCCC	CUGAUGAG	X	CGAA	ICUUUUCU	1125	AGAAAAGC	A	GGGTGTTC	1849
397	GUUGAGCA	CUGAUGAG	X	CGAA	TACGACAC	1126	GTGTGCTC	A	TGCTCAAC	1850
401	CUCUGUGU	CUGAUGAG	X	CGAA	ICAUGAGC	1127	CGTCATGC	T	CAACAGAG	1851
403	CACUCUGU	CUGAUGAG	X	CGAA	IAGCAUGA	1128	TCACTGTC	A	ACAGAGTG	1852
406	CAUCACUC	CUGAUGAG	X	CGAA	IUUGAGCA	1129	TGCTCAAC	A	GAGTGATG	1853
438	CAGUAUUG	CUGAUGAG	X	CGAA	ICGCAUUG	1130	AAATGCCG	A	CAATACTG	1854
440	GCCAGUAU	CUGAUGAG	X	CGAA	IUGCGCAU	1131	ATCTGGCC	A	ATACTGGC	1855
445	UUGUGGCC	CUGAUGAG	X	CGAA	IUAUUGUG	1132	CACAATGC	T	GGCCACAA	1856
449	CUUUUUGU	CUGAUGAG	X	CGAA	ICCAUAU	1133	ATACTGGC	C	ACAAAAGG	1857
450	UCUUUUUG	CUGAUGAG	X	CGAA	IGCCAGUA	1134	TACTGGCC	A	CAAAAAGA	1858
452	CUUCUUUU	CUGAUGAG	X	CGAA	IUGGCCAG	1135	CTGGCCAG	A	AAAAGAGG	1859
475	GUUCUCAA	CUGAUGAG	X	CGAA	IUAUCAUC	1136	AGATGATC	T	TTGAAGAC	1860
484	CAAAUUGG	CUGAUGAG	X	CGAA	IUCUUCAA	1137	TTGAAGAC	A	CAAAATTTG	1861
486	UUCAAAUU	CUGAUGAG	X	CGAA	IUGUCUUC	1138	GAAGACAC	A	AAATTTGA	1862
501	GAGAUCAA	CUGAUGAG	X	CGAA	IUAUAUUU	1139	AAATTAAC	A	TTGATCTC	1863
508	AUCUUCAG	CUGAUGAG	X	CGAA	IUAUCAUG	1140	CATTGATC	T	CTGAAGAT	1864
510	AUAUCUUC	CUGAUGAG	X	CGAA	IAGAUCAA	1141	TGATCTCT	T	GAGATATAT	1865
520	AUAUGACU	CUGAUGAG	X	CGAA	IUAUUCUU	1142	AAGATATC	A	AGTCATAT	1866
525	GUUAUAUA	CUGAUGAG	X	CGAA	IACUUGAU	1143	ATCAAGTC	A	TATTATAT	1867
534	UGUCGCAU	CUGAUGAG	X	CGAA	IUAUAUAU	1144	TATTATAT	A	GTGGCACA	1868
542	AUAUCUAG	CUGAUGAG	X	CGAA	IUCGCACU	1145	AGTGCAGC	A	GCTAGAAT	1869
545	CCAAUUCU	CUGAUGAG	X	CGAA	ICUGUCGC	1146	GCGACAGC	T	AGAATTTG	1870

Table 4

559	GGUUGUAA	CUGAUGAG	X	CGAA	IUUUCCA	1147	TGAAAAAC	C	TTACAACC	1871
560	GGUUGUAA	CUGAUGAG	X	CGAA	IUUUJCC	1148	GGAAAAAC	T	TACAACCC	1872
564	UCUUGGGU	CUGAUGAG	X	CGAA	IUAAGGUU	1149	AACCTTAC	A	ACCCAAGA	1873
567	GUUUCUUG	CUGAUGAG	X	CGAA	IUUGUAG	1150	CTTACAAC	C	CAAGAAAC	1874
568	AGUUUCUU	CUGAUGAG	X	CGAA	IQUUGUAA	1151	TTACAACC	C	AAGAAACT	1875
569	GAGUUUCU	CUGAUGAG	X	CGAA	IGGUUGUA	1152	TACAACCC	A	AGAAACTC	1876
576	AUCUCUCG	CUGAUGAG	X	CGAA	IUUUCUUG	1153	CAAGAAAC	T	CGAGAGAT	1877
586	GAAUUGUA	CUGAUGAG	X	CGAA	IACUCUCU	1154	GAGAGATC	T	TACATTTT	1878
590	AGUGGAAA	CUGAUGAG	X	CGAA	IUAAGAUC	1155	GATCTTAC	A	TTTCCACT	1879
595	GGUUAAGU	CUGAUGAG	X	CGAA	IAAAUGUA	1156	TACATTTT	C	ACTATACC	1880
596	UGGUAUAG	CUGAUGAG	X	CGAA	IGAAAUUG	1157	ACATTTTC	A	CTATACCA	1881
598	UGUGGUUU	CUGAUGAG	X	CGAA	IUGGAAUU	1158	ATTTCCAC	T	ATACCACA	1882
603	GGCCAUUG	CUGAUGAG	X	CGAA	IUAUAGUG	1159	CACTATAC	C	ACATGGCC	1883
604	AGGCCAUG	CUGAUGAG	X	CGAA	IGUAUAGU	1160	ACTATACC	A	CATGGCCT	1884
606	UCAGGCCA	CUGAUGAG	X	CGAA	IUGGUUAU	1161	TATACCAC	A	TGGCCTGA	1885
611	CAAGAUCA	CUGAUGAG	X	CGAA	ICCAUGUG	1162	CATATGCC	C	TGACTTTG	1886
612	CCAAGAUC	CUGAUGAG	X	CGAA	IGCCAUUG	1163	ACATGGCC	T	GACTTTGG	1887
616	GACUCCAA	CUGAUGAG	X	CGAA	IUCAGGCC	1164	GGGCTGAC	T	TTGGAGTC	1888
625	UGAUUCAG	CUGAUGAG	X	CGAA	IACUCCAA	1165	TTGGAGTC	C	CTGAATCA	1889
626	GUGAUJCA	CUGAUGAG	X	CGAA	IGACUCCA	1166	TGGAGTTC	C	TGAATCAC	1890
627	GGUGAUUC	CUGAUGAG	X	CGAA	IGGACUCC	1167	GGAGTCCC	T	GAATCACC	1891
633	GAGGCUGG	CUGAUGAG	X	CGAA	IUAUCAGG	1168	CCTGAATC	A	CCAGCCTC	1892
635	AUAGGCGU	CUGAUGAG	X	CGAA	IUGAUJCA	1169	TGAATCAC	C	AGCTCAT	1893
636	AAUGAGGC	CUGAUGAG	X	CGAA	IGUGAUUC	1170	GAATCACC	A	GCCTCAT	1894
639	AAGAUGA	CUGAUGAG	X	CGAA	ICUGGUGA	1171	TCACCAGC	C	TCATTTCT	1895
640	CAAGAAUG	CUGAUGAG	X	CGAA	IGCUGGUG	1172	CACCAGCC	T	CATTTCTG	1896
642	IUUAAGAA	CUGAUGAG	X	CGAA	IAGGCUGG	1173	CCAGCCTC	A	TTCTTGAA	1897
646	AAAGUJCA	CUGAUGAG	X	CGAA	IAAUAGGG	1174	CCTCATTC	T	TGAATCTT	1898
652	GAAAGAAA	CUGAUGAG	X	CGAA	IUUAAGAA	1175	TCTTGAAC	T	TTCTTTTC	1899
656	CUUUGAAA	CUGAUGAG	X	CGAA	IAAAGUUC	1176	GAATTTTC	T	TTTCAAG	1900
661	UCGAGCTU	CUGAUGAG	X	CGAA	IAAAAGAA	1177	TTCTTTTC	A	AACTCCGA	1901
667	UGACUCUC	CUGAUGAG	X	CGAA	IACUUUGA	1178	TCAAAGTC	C	GAGAGTCA	1902
675	AGUGACCC	CUGAUGAG	X	CGAA	IACUCUCG	1179	CGAGAGTC	A	GGTCACT	1903
681	GGGUCUGG	CUGAUGAG	X	CGAA	IACCUGGA	1180	TCAGGGTC	A	CTCAGCCC	1904
683	CCGGGCUU	CUGAUGAG	X	CGAA	IUGACCCU	1181	AGGTCAC	T	CAGCCCGG	1905
685	CUCGGGCG	CUGAUGAG	X	CGAA	IAGUGACC	1182	GGTCACTC	A	GCCCGGAG	1906
688	GUGUCUCG	CUGAUGAG	X	CGAA	ICUGAUGG	1183	CATCTAGC	C	CGAGGCAC	1907
689	CGUUCUCC	CUGAUGAG	X	CGAA	IGCUGAGU	1184	ACTCAGCC	C	GGAGCAGG	1908
695	CGGGCCCG	CUGAUGAG	X	CGAA	ICUCCGGG	1185	CCCGGAGC	A	CGGGCCCG	1909
701	CCACAAGC	CUGAUGAG	X	CGAA	ICCCGUGC	1186	GCACGGGC	C	CGTGTGGG	1910
702	ACCACAAC	CUGAUGAG	X	CGAA	IGCCGUGG	1187	CACGGGCC	C	GTTGTGGT	1911
713	CACUGCAG	CUGAUGAG	X	CGAA	ICACCACA	1188	TGTGGTGC	A	CTGCAGTG	1912
715	UGCACUGC	CUGAUGAG	X	CGAA	IUGCACC	1189	TGTGTGAC	T	GCAGTGCA	1913
718	GCCUGCAC	CUGAUGAG	X	CGAA	ICAGUGCA	1190	TGCATGAC	A	GTGCAGGC	1914
723	CCGAUGCC	CUGAUGAG	X	CGAA	ICACUGCA	1191	TGCAGTGC	A	GGCATCGG	1915
727	CCUGCCGA	CUGAUGAG	X	CGAA	ICUCUGAC	1192	GTCGAGGC	A	TCGGCAGG	1916
733	UCCAGACC	CUGAUGAG	X	CGAA	ICCGAUGC	1193	GCATCGGC	A	GGTCTGGA	1917

Table 4

738	AAGGUUCC CUGAUGAG X CGAA IACCUGCC	1194	GGCAGGTC T GGAACCTT	1918
744	AGACAGAA CUGAUGAG X CGAA IUUCCAGA	1195	TCTGGAAC C TTCTGTCT	1919
745	CAGACAGA CUGAUGAG X CGAA IGUCCAG	1196	CTGGAACC T TCTGTCTG	1920
748	AGCCAGAC CUGAUGAG X CGAA IAAGGUUC	1197	GAACCTTC T GTCTGGCT	1921
752	UAUCAGCC CUGAUGAG X CGAA IACGAAAG	1198	CTTCTGTC T GGCTGATA	1922
756	CAGGUUUC CUGAUGAG X CGAA ICCAGACA	1199	TGTCTGGC T GATACCTG	1923
762	AAGAGCCA CUGAUGAG X CGAA IUUACAGC	1200	GCTGATAC C TGCTCTTT	1924
763	CAGAAGGC CUGAUGAG X CGAA IGUAUCAG	1201	CTGATACC T GGCTCTTG	1925
766	CAGCAAGA CUGAUGAG X CGAA ICAGGUU	1202	ATACCTGC C TCTTGCTG	1926
767	UCAGCAAG CUGAUGAG X CGAA ICGAGGUA	1203	TACCTGCC T CTTGCTGA	1927
769	CAACAGCA CUGAUGAG X CGAA IAGCGAGG	1204	CCTGGCTC T TGCTGATG	1928
773	UGUCCAUC CUGAUGAG X CGAA ICAAGAGG	1205	CCTCTTGC T GATGGACA	1929
781	UUUCCUCU CUGAUGAG X CGAA IUCCAUCA	1206	TGATGGAC A AGAGGAAA	1930
793	GGAAAGAG CUGAUGAG X CGAA IUUUUUUC	1207	GGAAAGAC C CTTCTTCC	1931
794	CGGAAGAA CUGAUGAG X CGAA IGUCUUUC	1208	GAAGACCC C TTCTTCGG	1932
795	ACGAAGAA CUGAUGAG X CGAA TGGUCCUU	1209	AAAGACCC T TCTTCCGT	1933
798	UCAAACGA CUGAUGAG X CGAA IAAGGGUC	1210	GACCTTTC T TCCGTGTA	1934
801	UAUUAAC CUGAUGAG X CGAA IAAGAAGG	1211	CCTTCTTC C GTTGATAT	1935
811	CACUUUCU CUGAUGAG X CGAA TAAUACAA	1212	TTGATATC A AGAAGATG	1936
821	UUUUAAC CUGAUGAG X CGAA ICACUUUC	1213	GAAAGTGC T GTTAGAAA	1937
851	UCUGGAUC CUGAUGAG X CGAA ICCCCAUC	1214	GATGGGCG T GATCCAGA	1938
856	GGCUGUCU CUGAUGAG X CGAA TAUCAAGC	1215	GGCTGATC C AGACAGCC	1939
857	CGGUGUC CUGAUGAG X CGAA IGAUCAGC	1216	GCTGATCC A GACAGCCG	1940
861	UGUGCGGC CUGAUGAG X CGAA TUCUGGAU	1217	ATCCAGAC A GCCGACCA	1941
864	AGCUGGUC CUGAUGAG X CGAA TUGUCUG	1218	CAGACAGC C GACGAGCT	1942
868	GGCAGCUC CUGAUGAG X CGAA TUCGGCUG	1219	CAGCCGAC C AGCTGCCG	1943
869	AGCGCAGC CUGAUGAG X CGAA TGUCGGCU	1220	AGCCGACC A GCTGCCCT	1944
872	AGAAGCGC CUGAUGAG X CGAA TCUGGUCG	1221	CGACAGAC T GCGCTTCT	1945
877	GUAGGAGA CUGAUGAG X CGAA TCGCAGCU	1222	AGCTGCCG T TCTCTTAC	1946
880	CAGGUAGG CUGAUGAG X CGAA TAAGGSCA	1223	TGCGCTTC T CTTACCTG	1947
882	GCCAGGUA CUGAUGAG X CGAA TAGAAGCG	1224	CGCTTCTC C TACCTGCG	1948
883	AGCCAGGU CUGAUGAG X CGAA TGAGAAGC	1225	GCTTCTCC T ACCTGGCT	1949
886	CACAGCCA CUGAUGAG X CGAA IUAGGAGA	1226	TCTCTTAC C TGGCTGTG	1950
887	UCACAGCC CUGAUGAG X CGAA IGUAGGAG	1227	CTCCTACC T GGCTGTGA	1951
891	UCGUAAC CUGAUGAG X CGAA ICCAGGUA	1228	TACCTGGC T GTGATCGA	1952
906	AGAAUUU CUGAUGAG X CGAA TCACCUUC	1229	GAAGGTGC C AAATTCAT	1953
907	GAUGAAUU CUGAUGAG X CGAA TGCACCUU	1230	AAGGTGCC A AATTCATC	1954
913	CCCCAUGA CUGAUGAG X CGAA TAAUUUGG	1231	CAAATTC A TCATGGGG	1955
916	GUCCCCCA CUGAUGAG X CGAA TAUGAAUU	1232	AATTCATC A TGGGGGAC	1956
925	CACGGAAG CUGAUGAG X CGAA IUCCCCCA	1233	TGCGGGAC T CTTCCGTG	1957
927	UGCAGCGA CUGAUGAG X CGAA IAGUCCCC	1234	GGGAGCTC T TCCGTGCA	1958
930	UCCUGCAC CUGAUGAG X CGAA IAAGAGUC	1235	GACTCTTC C GTGACGGA	1959
935	ACUGAUCC CUGAUGAG X CGAA ICACGGAA	1236	TTCCGTGC A GGATCAGT	1960
941	CCUUCAC CUGAUGAG X CGAA IAUCCUCC	1237	CGAGATGC A GTGGAAGG	1961
953	CGUGGGAA CUGAUGAG X CGAA ICUCUUC	1238	GAAGGAGC T TTCCACCG	1962
957	UCCUCGUG CUGAUGAG X CGAA TAAAGCUC	1239	GAGCTTTC C CACGAGGA	1963
958	GUCCUCGU CUGAUGAG X CGAA TGAAGACU	1240	AGCTTTC C ACGAGGAC	1964

Table 4

959	GGUCCUCG	CUGAUGAG	X	CGAA	IGGAAAGC	1241	GCITTCCTCC	A	CGAGGACC	1965
967	GGGCUCCA	CUGAUGAG	X	CGAA	IUCUCUGU	1242	ACGAGGAC	C	TGGAGCCC	1966
968	GGGGCUCC	CUGAUGAG	X	CGAA	IGUCCUCG	1243	CGAGGACC	T	GGAGCCC	1967
974	CGGUGUGG	CUGAUGAG	X	CGAA	ICUCCAGG	1244	CCTGGAGC	C	CCCACCGG	1968
975	UCGGGUGG	CUGAUGAG	X	CGAA	IGUCCAG	1245	CTGGAGCC	C	CCACCCGA	1969
976	CUCCGUGU	CUGAUGAG	X	CGAA	IGGCUCCA	1246	TGGAGCCC	C	CACCCGAG	1970
977	GCUCGGGU	CUGAUGAG	X	CGAA	IGGGUCC	1247	GGAGCCCC	C	ACCCGAGC	1971
978	UGUCUGGG	CUGAUGAG	X	CGAA	IGGGGUCU	1248	GAGCCCCC	A	CCCGAGCA	1972
980	UAUCUCUG	CUGAUGAG	X	CGAA	IUGGGGGC	1249	GCCTCCAC	C	CGAGCATA	1973
981	AUAUCUCU	CUGAUGAG	X	CGAA	IGUGGGGG	1250	CCCCCACC	C	GAGCATAT	1974
986	GGGGGAUA	CUGAUGAG	X	CGAA	ICUCGGGU	1251	ACCCGAGC	A	TATCCCCC	1975
991	AGGUGGGG	CUGAUGAG	X	CGAA	IAUAUGGU	1252	AGCATATC	C	CCCCACCT	1976
992	GAGGUGGG	CUGAUGAG	X	CGAA	IGUAUUGC	1253	GCATATCC	C	CCCACCTC	1977
993	GGAGGUGG	CUGAUGAG	X	CGAA	IGGAUAUG	1254	CATATCCC	C	CCACTCCC	1978
994	GGGAGGUG	CUGAUGAG	X	CGAA	IGGGAUAU	1255	ATATCCCC	C	CACCTCCC	1979
995	GGGAGGUU	CUGAUGAG	X	CGAA	IGGGGAUA	1256	TATCCCCC	C	ACCTCCCC	1980
996	CGGGGAGG	CUGAUGAG	X	CGAA	IGGGGAUA	1257	ATCCCCC	A	CTCCCCCG	1981
998	CGCCGGGA	CUGAUGAG	X	CGAA	IUGGGGGG	1258	CCCCCACC	C	TCCCCGGC	1982
999	GGCCGGGG	CUGAUGAG	X	CGAA	IUGGGGGG	1259	CCCCCACC	T	CCCCGGCC	1983
1001	GUGGCCGG	CUGAUGAG	X	CGAA	IAGGUGGG	1260	CCCACCTC	C	CCGGCCAC	1984
1002	GGUGGCCG	CUGAUGAG	X	CGAA	IAGGUGGG	1261	CCACCTCC	C	CGGCCACC	1985
1003	GGUGGCCC	CUGAUGAG	X	CGAA	IGGAGGUG	1262	CACCTCCC	C	GGCCACCC	1986
1007	GUUUGGGU	CUGAUGAG	X	CGAA	ICCGGGGA	1263	TCCCCGGC	C	ACCCAAAC	1987
1008	CGUUGGGG	CUGAUGAG	X	CGAA	IGCCGGGG	1264	CCCCGGCC	A	CCCAAGCC	1988
1010	UUCGUUGU	CUGAUGAG	X	CGAA	IUGGCCGG	1265	CCGGCCAC	C	CAACGAA	1989
1011	AUUCGUUU	CUGAUGAG	X	CGAA	IUGGCCCG	1266	CGCCACCC	C	AAACGAAT	1990
1012	GAUUCGUU	CUGAUGAG	X	CGAA	IGGUGGCC	1267	GGCCACCC	A	AACGAATC	1991
1021	UGGCUCCA	CUGAUGAG	X	CGAA	IAUUCGUU	1268	AACGAATC	C	TGGAGCCA	1992
1022	GUGGCUCC	CUGAUGAG	X	CGAA	IGUAUUGU	1269	ACGAATCC	T	GGAGCCAC	1993
1028	CAUUGUGU	CUGAUGAG	X	CGAA	ICUCCAGG	1270	CCTGGAGC	C	ACACAATG	1994
1029	CCAUGUGU	CUGAUGAG	X	CGAA	IGUCCAG	1271	CTGGAGCC	A	CACAATGG	1995
1031	UCCCAUUG	CUGAUGAG	X	CGAA	IUGGCUCC	1272	GGAGCCAC	A	CAATGGGA	1996
1033	UUUCCCAU	CUGAUGAG	X	CGAA	IUGGCGU	1273	AGCCACAC	A	ATGGGAAA	1997
1045	GAACUCCC	CUGAUGAG	X	CGAA	ICAUUCCC	1274	GGAAATGC	A	GGGAGTTC	1998
1054	AUUUGGGA	CUGAUGAG	X	CGAA	IAACUCCC	1275	GGGAGTTC	T	TCGCCAAT	1999
1057	GUUAUUUG	CUGAUGAG	X	CGAA	IAAGAAAU	1276	AGTTCCTC	C	CAATACAC	2000
1058	GGUGUAUU	CUGAUGAG	X	CGAA	IGAAGAAC	1277	GTCTCTCC	C	AAATCACC	2001
1059	UGGUGUAU	CUGAUGAG	X	CGAA	IGGAAGAA	1278	TTCTCTCC	A	AATCACC	2002
1064	CCACUUGG	CUGAUGAG	X	CGAA	IAUUUGGG	1279	CCCAATAT	C	CAAGTGGG	2003
1066	CACCCACU	CUGAUGAG	X	CGAA	IUGAUUUG	1280	CAATCACC	C	AGTGGGTG	2004
1067	UCACCCAC	CUGAUGAG	X	CGAA	IGUGAUUU	1281	AAATCACC	A	GTGGGTGA	2005
1086	UCCUCUGG	CUGAUGAG	X	CGAA	IUCUCUUC	1282	GAAGAGAC	C	CAAGAGGA	2006
1087	AUCCUCCU	CUGAUGAG	X	CGAA	IGUCUCUU	1283	AAGAGACC	C	AGGAGGAT	2007
1088	UAUCCUCC	CUGAUGAG	X	CGAA	IGUCUCUU	1284	AGAGACCC	A	GGAGATA	2008
1102	GAUGGGGC	CUGAUGAG	X	CGAA	IUCUUUAU	1285	ATAAAGAT	T	GCCTCATT	2009
1105	CUUGAUGG	CUGAUGAG	X	CGAA	ICAGUCUU	1286	AAGACTGC	C	CCATCAAG	2010
1106	CCUUGAUG	CUGAUGAG	X	CGAA	IGCAGUCU	1287	AGACTGCC	C	CATCAAGG	2011

Table 4

1107	UCCUUGAU	CUGAUGAG	X	CGAA	IGGCAGUC	1288	GACTGCCC	C	ATCAAGGA	2012
1108	UCCUCUGA	CUGAUGAG	X	CGAA	IGGCGAGU	1289	ACTGCCCC	A	TCAAGGAA	2013
1111	UUCUJCCU	CUGAUGAG	X	CGAA	IAUGGGGC	1290	CCCCCCTC	A	AGGAAGAA	2014
1129	AUUUAAGG	CUGAUGAG	X	CGAA	ICUUCCUU	1291	AAGGAAGC	C	CCCTAAAT	2015
1130	CAUUUAAG	CUGAUGAG	X	CGAA	IGCUUCCU	1292	AGGAAGGC	C	CTTAATATG	2016
1131	GCAUUJAA	CUGAUGAG	X	CGAA	IGGCUUCC	1293	GGAAGCCC	C	T'AAATGC	2017
1132	GGCAUUUA	CUGAUGAG	X	CGAA	IGGCGUUC	1294	GAAGCCCC	T	TAAATGCC	2018
1140	UAGGGUUC	CUGAUGAG	X	CGAA	ICAUUUAA	1295	T'AAATGC	C	GCACCCCTA	2019
1143	CCGUAGGG	CUGAUGAG	X	CGAA	ICGGCAUU	1296	AATGCCGC	A	CCCTACGG	2020
1145	UGCCGUAG	CUGAUGAG	X	CGAA	IUGCGGCA	1297	TGCCGCAC	C	CTACGGCA	2021
1146	AUGCCGUA	CUGAUGAG	X	CGAA	TGUGCGGC	1298	GCCGCACC	C	TACGGCAT	2022
1147	GAUGCCGU	CUGAUGAG	X	CGAA	IGUUGCGG	1299	CCGCACCC	T	ACGGCATC	2023
1153	GCUUUCGA	CUGAUGAG	X	CGAA	ICCGUAGG	1300	CCCTACGGC	A	TGGAAGGC	2024
1162	UUGACUCA	CUGAUGAG	X	CGAA	ICUUUCGA	1301	TGGAATGC	A	TGAGTCAA	2025
1169	CAGUGUCU	CUGAUGAG	X	CGAA	IACUCAUG	1302	CATGAGTC	A	AGACACTG	2026
1174	AACUUCAG	CUGAUGAG	X	CGAA	IUCUUGAC	1303	GTCAAGTC	A	CTGAAGTT	2027
1176	CUAACUUC	CUGAUGAG	X	CGAA	IUGUCUUG	1304	CAAGACAC	T	GAAGTTAG	2028
1208	CACCUCGA	CUGAUGAG	X	CGAA	IACUUCCC	1305	GGGAAGTC	T	TGAGGCTG	2029
1218	GCAGCCUG	CUGAUGAG	X	CGAA	ICACUUCG	1306	CGAGGTGC	C	CAGGCTGC	2030
1219	GGCAGCCU	CUGAUGAG	X	CGAA	IGCACCCU	1307	GAGGTGCC	C	AGGCTGCC	2031
1220	AGGCAGCC	CUGAUGAG	X	CGAA	IGGCACCU	1308	AGGTGCCC	A	GGCTGCCT	2032
1224	GGGAGGAC	CUGAUGAG	X	CGAA	ICCUGGGC	1309	GCCACGCC	T	GCCTCCCT	2033
1227	GCUGGGGA	CUGAUGAG	X	CGAA	ICAGCCUG	1310	CAGGTGTC	C	TCCCCAGC	2034
1228	GGCUGGGG	CUGAUGAG	X	CGAA	IGCAGCCU	1311	AGGCTGCC	T	CCCCAGCC	2035
1230	UUGGCUUG	CUGAUGAG	X	CGAA	IAGGCAGC	1312	GCTGCTTC	C	CCAGCCAA	2036
1231	UUUGGCUU	CUGAUGAG	X	CGAA	IGAGGCAG	1313	CTGCTTCC	C	CAGCCAAA	2037
1232	CUUUGGCU	CUGAUGAG	X	CGAA	IGGAGGCA	1314	TGCTTCCC	C	AGCCAAAG	2038
1233	CCUUUGGC	CUGAUGAG	X	CGAA	IGGAGGCC	1315	GCCTCCCC	A	GCCAAAGG	2039
1236	UCCCUUUU	CUGAUGAG	X	CGAA	ICUGGGGA	1316	TCCCCAGC	C	AAAGGGGA	2040
1237	CUCCCCUU	CUGAUGAG	X	CGAA	IGCUGGGG	1317	CCCCAGCC	A	AAGGGGAG	2041
1247	GCAGUGAC	CUGAUGAG	X	CGAA	ICUCCCUU	1318	AGGGGAGC	C	GTCACTGC	2042
1251	UCGGGCAG	CUGAUGAG	X	CGAA	IACGGCUC	1319	GAGCGCTC	A	CTGCCCGA	2043
1253	UCUCGGGC	CUGAUGAG	X	CGAA	IUGACGGC	1320	GCGGTCAC	T	GCCCGAGA	2044
1256	CCUUCUCG	CUGAUGAG	X	CGAA	ICAGUGAC	1321	GTCACTGC	C	CGAGAAGG	2045
1257	UCCUUCUC	CUGAUGAG	X	CGAA	IGCAGUGA	1322	TCAGTGC	C	GAGAAGGA	2046
1273	CAGUCCAU	CUGAUGAG	X	CGAA	IUCUUCGU	1323	ACGAGGAC	C	ATGCACTG	2047
1274	UCAGUGCA	CUGAUGAG	X	CGAA	IGUCCUCG	1324	CGAGGACC	A	TGCACTGA	2048
1278	UAAUCUCAG	CUGAUGAG	X	CGAA	ICAUUGGU	1325	GACCATGC	A	CTGAGTCA	2049
1280	AGUAAUCU	CUGAUGAG	X	CGAA	IUGCAUUG	1326	CCATGCAC	T	GAGTTACT	2050
1288	GGGCUUCC	CUGAUGAG	X	CGAA	IUAACUCA	1327	TGAGTTAC	T	GGAAGCCC	2051
1295	CCAGGAAG	CUGAUGAG	X	CGAA	ICUUCCAG	1328	CTGGAAGC	C	CTTCTGGT	2052
1296	ACCAAGAA	CUGAUGAG	X	CGAA	IGCUUCCA	1329	TGGAAGCC	C	TTCCTGGT	2053
1297	GACCAGGA	CUGAUGAG	X	CGAA	IGGCUUCC	1330	GGAAGCCC	T	TCCTGGTC	2054
1300	GUUGACCA	CUGAUGAG	X	CGAA	IAAGGGCU	1331	AGCCCTTC	C	TGGTCAAC	2055
1301	UGUGAACC	CUGAUGAG	X	CGAA	IGAAAGGC	1332	GCCTTCTC	T	TGGTCAACA	2056
1306	GCACAUGU	CUGAUGAG	X	CGAA	IACCAGGA	1333	TCCTGGTC	A	ACATGTGC	2057
1309	CACGCACA	CUGAUGAG	X	CGAA	IUGUACCA	1334	TGGTCAAC	A	TGTGCGTG	2058

Table 4

1320	AGGACCGU	CUGAUGAG	X	CGAA	ICCCACGA	1335	TGCGTGGC	T	ACGGTCTC	2059
1327	GGCCGUGA	CUGAUGAG	X	CGAA	IACCGUAG	1336	CTACGGTC	C	TCACGGCC	2060
1328	CGGCGUG	CUGAUGAG	X	CGAA	IGACCGUA	1337	TACGGTCC	T	CACGGCCG	2061
1330	GCCGGCCG	CUGAUGAG	X	CGAA	IAGGACCG	1338	CGGTCTTC	A	CGCGCGCG	2062
1335	UAAGCGCC	CUGAUGAG	X	CGAA	ICCGUGAG	1339	CTCACGGC	C	GGCGCTTA	2063
1341	CAGAGGUA	CUGAUGAG	X	CGAA	ICGCGGCG	1340	GCGCGCGC	T	TACCTCTG	2064
1345	GUAGCAGA	CUGAUGAG	X	CGAA	IUAAGCGC	1341	GGGCTTAC	C	TCTGCTAC	2065
1346	UUGAGCAG	CUGAUGAG	X	CGAA	IUAAGCGC	1342	CGCTTACC	T	CTGTACAC	2066
1348	CCUGAGCC	CUGAUGAG	X	CGAA	IAGGUAAG	1343	CTTACCCT	T	GCTACAGG	2067
1351	GAACCCUG	CUGAUGAG	X	CGAA	ICAGAGGU	1344	ACCTCTGC	T	ACAGGTTT	2068
1354	CAGGAACC	CUGAUGAG	X	CGAA	IUAGCAGA	1345	TCTGTAC	A	GGTCTCTG	2069
1360	GUUGAACA	CUGAUGAG	X	CGAA	IAACCTUGU	1346	ACAGGTTT	C	TGTTCAAC	2070
1361	UGUUGAAC	CUGAUGAG	X	CGAA	IGAACCCG	1347	CAGGTTCC	T	GTTCAACA	2071
1366	GUUGUCUG	CUGAUGAG	X	CGAA	IAACAGGA	1348	TCCTGTTT	A	ACAGCAAC	2072
1369	UGUGUCC	CUGAUGAG	X	CGAA	IUGAACA	1349	TGTTCAAC	A	GCACACA	2073
1372	CUAUGUGU	CUGAUGAG	X	CGAA	ICUGUUGA	1350	TCAACAGC	A	ACACATAG	2074
1375	AGGCUAUG	CUGAUGAG	X	CGAA	IUGUCUGU	1351	ACAGCAAC	A	CATAGGCT	2075
1377	UCAGGCUA	CUGAUGAG	X	CGAA	IUGUUGCU	1352	AGCAACAC	A	TAGCTGTA	2076
1382	GAGGGUCA	CUGAUGAG	X	CGAA	ICUAUGUG	1353	CACATAGC	C	TGACCTTC	2077
1383	GAGGGUCC	CUGAUGAG	X	CGAA	IGCUAUGU	1354	ACATAGCC	T	GACCTCTC	2078
1387	UGGAGGAG	CUGAUGAG	X	CGAA	IUCAGGCU	1355	AGCCTGAC	C	CTCTCCCA	2079
1388	UGGAGGAA	CUGAUGAG	X	CGAA	IUGCAGGC	1356	GGCTGACC	C	TCCTCCAC	2080
1389	AGUGGAGG	CUGAUGAG	X	CGAA	IGGUCAGG	1357	CGTGACCC	T	CCTCCACT	2081
1391	GGAGUGGA	CUGAUGAG	X	CGAA	IAGGGUCA	1358	TGACCTTC	C	TCCACTCC	2082
1392	UGGAGUGG	CUGAUGAG	X	CGAA	IAGGGUCC	1359	GACCTCTC	T	CCACTCCA	2083
1394	GGUGGAGU	CUGAUGAG	X	CGAA	IAGGAGGG	1360	CCCTCCTC	C	ACTCCACC	2084
1395	AGGUGGAG	CUGAUGAG	X	CGAA	IAGGAGGG	1361	CCTCCTCC	A	CTCCACCT	2085
1397	GGAGGUUG	CUGAUGAG	X	CGAA	IUGGAGGA	1362	TCCTCCAC	T	CCACTCTC	2086
1399	GUUGGAGU	CUGAUGAG	X	CGAA	IAGUGGAG	1363	CTCCACTC	C	ACCTCCAC	2087
1400	GGUGGAGG	CUGAUGAG	X	CGAA	IAGUGGGA	1364	TCCACTCC	A	CCTCCACC	2088
1402	UGGUGGGA	CUGAUGAG	X	CGAA	IUGGAGUG	1365	CACCTCCT	C	TCCACCCA	2089
1403	GUUGGUUG	CUGAUGAG	X	CGAA	IUGGAGUG	1366	ACTCCACC	T	CCACCCAC	2090
1405	CAGUGGGU	CUGAUGAG	X	CGAA	IAGGUGGA	1367	TCCACCTC	C	ACCCACTG	2091
1406	ACAGUGGG	CUGAUGAG	X	CGAA	IGAGGUGG	1368	CCACCTCC	A	CCCACTGT	2092
1408	GGACAGUG	CUGAUGAG	X	CGAA	IUGGAGGU	1369	ACCTCCAC	C	CACTGTCC	2093
1409	CGGACAGU	CUGAUGAG	X	CGAA	IGUGGAGG	1370	CCTCCACC	C	ACTGTCCG	2094
1410	GGGACAG	CUGAUGAG	X	CGAA	IGUGGAGG	1371	CTCCACCC	A	CTGTCCGC	2095
1412	AGGCGGAC	CUGAUGAG	X	CGAA	IUGGGUGG	1372	CCACCCAC	T	GTCCGGCT	2096
1416	GCAGAGGC	CUGAUGAG	X	CGAA	IACAGUGG	1373	CCACTGTC	C	GCCTCTGC	2097
1419	CGGGCAGA	CUGAUGAG	X	CGAA	ICGGACAG	1374	CTGTCCGC	C	TCTGCCCG	2098
1420	GCGGGCAG	CUGAUGAG	X	CGAA	ICGGGACA	1375	TGTCTCCG	T	CTCCGGCG	2099
1422	UGCGGGCC	CUGAUGAG	X	CGAA	IAGGCGGA	1376	TCCGCTCT	T	CGGCGCAG	2100
1425	GCUCUCGC	CUGAUGAG	X	CGAA	ICAGAGGC	1377	GCCTCTGC	C	CGCAGAGC	2101
1426	GGCUCUCG	CUGAUGAG	X	CGAA	ICGAGAGG	1378	CCTCTGCC	C	GCAGAGCC	2102
1429	UGGGCCUC	CUGAUGAG	X	CGAA	ICGGGACG	1379	CTGCGCCG	A	GAGCCAC	2103
1434	CGGGCGUG	CUGAUGAG	X	CGAA	ICUCUGCG	1380	CGCAGAGC	C	CAGGCCCG	2104
1435	UGGGCGUG	CUGAUGAG	X	CGAA	ICUCUGCG	1381	GCAGAGCC	C	ACGACCGA	2105

Table 4

1436	GUCGGCG CUGAUGAG	X CGAA	IGGCUUG	1382	CAGAGCCC A CGCCCGAC	2106
1440	GCUAGUC CUGAUGAG	X CGAA	ICGUGGC	1383	GCCACGC C CGACTAGC	2107
1441	UGCUAGUC CUGAUGAG	X CGAA	ICGUGGC	1384	CCCACGCC C GACTAGCA	2108
1445	UGCCUGCU CUGAUGAG	X CGAA	IUGGGCG	1385	CGCCCGAC T AGCAGCA	2109
1449	GGCAUGCC CUGAUGAG	X CGAA	ICUAGUC	1386	CGACTAGC A GGCATGCC	2110
1453	CCGCGCA CUGAUGAG	X CGAA	ICCUUGA	1387	TAGCAGGC A TGCCGCG	2111
1457	CCUACGC CUGAUGAG	X CGAA	ICAUUGCU	1388	AGGCATGC C GGGTAGG	2112
1473	GGUCGGC CUGAUGAG	X CGAA	ICCUUAC	1389	GTAAGGC C GCGGAC	2113
1476	CGCGUCC CUGAUGAG	X CGAA	ICGGCCU	1390	AGGCGGC C GGACGCG	2114
1481	CUCUAGC CUGAUGAG	X CGAA	IUCGCGC	1391	CGCCGGAC C GGGTAGG	2115
1493	CGGGGCC CUGAUGAG	X CGAA	ICUCUCA	1392	TAGAGGC C GGGCCCG	2116
1498	CGUCCGC CUGAUGAG	X CGAA	ICCGGCU	1393	AGCCGGC C CGGACGG	2117
1499	UCCGUCG CUGAUGAG	X CGAA	IGCCCGC	1394	CGCCGGCC C CGGACGA	2118
1500	GCCGUCC CUGAUGAG	X CGAA	IGGCCGC	1395	CGGGGCC C GGCAGAC	2119
1517	UUUAGUC CUGAUGAG	X CGAA	IAACAAC	1396	GTTGGTTC T GCATATA	2120
1520	GUUUUAG CUGAUGAG	X CGAA	ICAGAAC	1397	GTTTCTGC A CTAACAC	2121
1522	UGGGUUU CUGAUGAG	X CGAA	IUGCAGA	1398	TTCTGCAT T AAAACCA	2122
1528	GGAAGAU CUGAUGAG	X CGAA	IUUUAGU	1399	ACTAAAC C CATCTTC	2123
1529	GGGAAGU CUGAUGAG	X CGAA	IUUUAGU	1400	CTAAAC C ATCTTCC	2124
1530	GGGAAGA CUGAUGAG	X CGAA	IUGUUUA	1401	TAAACCC A TCTTCCC	2125
1533	UCCGGGA CUGAUGAG	X CGAA	IUGGUGU	1402	AACCATC T TCCCGGA	2126
1536	ACUCCGG CUGAUGAG	X CGAA	IAGAUGG	1403	CCATCTC C CGGATGT	2127
1537	CACUCCG CUGAUGAG	X CGAA	IGAAGAU	1404	CATCTTC C CGGATGT	2128
1538	ACACUCC CUGAUGAG	X CGAA	TGAAGAU	1405	ATCTTCC C GGGATGT	2129
1550	GAGGGUG CUGAUGAG	X CGAA	IACACACA	1406	TGTGTGT C CACCCCT	2130
1552	AUGAGGG CUGAUGAG	X CGAA	IAGACACA	1407	TGTGTCT C CCCCCT	2131
1554	GGAUGAG CUGAUGAG	X CGAA	IUGAGACA	1408	TGTCTAC C CCTCATC	2132
1555	AGGAUGAG CUGAUGAG	X CGAA	IUGAGAC	1409	GTCTCAC C CTCCTCT	2133
1556	AAGGAUG CUGAUGAG	X CGAA	IGUGAGA	1410	TCTCAC C TCATCTT	2134
1557	AAAGGAUG CUGAUGAG	X CGAA	IGGUGAG	1411	CTCACCC T CATCTTT	2135
1559	UAAAGGA CUGAUGAG	X CGAA	IAGGGUG	1412	CACCCCT C TCCTTTA	2136
1562	AAGUAAA CUGAUGAG	X CGAA	IAGAGGG	1413	CCCTCAT C TTTTACT	2137
1563	AAAGUAAA CUGAUGAG	X CGAA	IGAUGAG	1414	CCTCAT C TTTTACT	2138
1569	GGCAAAA CUGAUGAG	X CGAA	IUAUAGG	1415	CTTTTAC T TTTGCC	2139
1576	GUGGAAG CUGAUGAG	X CGAA	ICAAAAAG	1416	CTTTTGC C CTTCAC	2140
1577	AGUGGAAG CUGAUGAG	X CGAA	IGCAAAA	1417	TTTTTGC C CTTCAC	2141
1578	AAGUGGA CUGAUGAG	X CGAA	IGCAAAA	1418	TTTTGCC C TTCACTT	2142
1579	AAAGUGGA CUGAUGAG	X CGAA	IGGGCAA	1419	TTTGCCC T TCACTT	2143
1582	CUCAAGU CUGAUGAG	X CGAA	IAGGGG	1420	GCCCTTC C ACTTTAG	2144
1583	ACUCAAG CUGAUGAG	X CGAA	IGAAGGG	1421	CCCTTCC A CTTTGT	2145
1585	GUACUCA CUGAUGAG	X CGAA	IUGAAGG	1422	CCTTCC T TTAGTAC	2146
1594	GUGGAUU CUGAUGAG	X CGAA	IUAUCUA	1423	TGAGTAC C AATCCAC	2147
1595	UGUGGAU CUGAUGAG	X CGAA	IUAUCUA	1424	TGAGTAC C AATCCAC	2148
1600	UGGCUUG CUGAUGAG	X CGAA	IUAUUGU	1425	ACCAATC C ACAAGCA	2149
1601	AUGCUUG CUGAUGAG	X CGAA	IUAUUGU	1426	CCAATCC A CAGCAT	2150
1603	AAUUGCU CUGAUGAG	X CGAA	IUGAUUU	1427	AAATCCAC A AGCATTT	2151
1607	CAAAAUU CUGAUGAG	X CGAA	ICUUGUG	1428	CCACAGC C ATTTTGT	2152

Table 4

1608	UCAA AAAA CUGAUGAG X CGAA IGCUGUG	1429	CACAAGCC A TTTTITGA	2153
1636	GCCAGCAU CUGAUGAG X CGAA IUACUCUC	1430	GAGAGTAC C ATGCTGGC	2154
1637	CGCCAGCA CUGAUGAG X CGAA IGUACUCU	1431	AGAGTACC A TGCTGGCG	2155
1641	GGCCGCGC CUGAUGAG X CGAA ICAUGGUA	1432	TACCATGC T GGCGCGCC	2156
1650	CUUCCGUC CUGAUGAG X CGAA IGCGCGCC	1433	GGCGGCGC A GAGGGAAG	2157
1663	CGGGUGUA CUGAUGAG X CGAA ICCCCUUC	1434	GAAGGGGC C TACACCCG	2158
1664	ACGGGUGU CUGAUGAG X CGAA IGCCCCUJ	1435	AAGGGGCT T ACACGGCT	2159
1667	AAGACGGG CUGAUGAG X CGAA IUAGGCC	1436	GGGCTTAC A CCGTCTT	2160
1669	CCAAGACG CUGAUGAG X CGAA IUGUAGGC	1437	GGCTACAC C CGTCTTGG	2161
1670	CCCAAGAC CUGAUGAG X CGAA IUGUAGG	1438	CCTACACC C GTCTTGGG	2162
1674	GAGCCCCA CUGAUGAG X CGAA IACGGGUG	1439	CACCCGTC T TGGGCTC	2163
1681	GUGGGGCG CUGAUGAG X CGAA ICCCCAAG	1440	CTTGGGGC T CGCCCCAC	2164
1685	CUGGGUGG CUGAUGAG X CGAA ICGAGCCC	1441	GGGCTCGC C CCACCCAG	2165
1686	CCUGGGUG CUGAUGAG X CGAA ICGAGGCC	1442	GGCTCGCC C CACCCAGG	2166
1687	CCUUGGGU CUGAUGAG X CGAA IGGCGAGC	1443	GCTCGGCC C ACCCAGGG	2167
1688	GCCUGGGG CUGAUGAG X CGAA IGGCGAG	1444	CTCGCCCC A CCCAGGGC	2168
1690	GAGCCGUG CUGAUGAG X CGAA IUGGGGCG	1445	CGCCCCAC C CAGGGCTC	2169
1691	GGAGCCCU CUGAUGAG X CGAA IUGGGGGC	1446	GCCCAACC C AGGGCTCC	2170
1692	GGGAGCCC CUGAUGAG X CGAA IGGGGGG	1447	CCCCACCC A GGGCTCCC	2171
1697	CAGGAGGG CUGAUGAG X CGAA ICCUGGG	1448	CCCAAGGC T CCCTCTTG	2172
1699	UCCAGGAG CUGAUGAG X CGAA IAGCCGUG	1449	CAGGGCTC C CTCTGGAG	2173
1700	CUCCAGGA CUGAUGAG X CGAA IAGCCCU	1450	AGGGCTCC C TCTGGAG	2174
1701	GUCCGAGG CUGAUGAG X CGAA IGGAGCCC	1451	GGGCTCCC T CCTGGAGC	2175
1703	AUGCUCCA CUGAUGAG X CGAA IAGGGAGC	1452	GCTCCCTC C TGAGCAT	2176
1704	GAUGCUCC CUGAUGAG X CGAA IAGGGAG	1453	CTCCCTCC T GGAGCATC	2177
1710	GCCUGGGA CUGAUGAG X CGAA ICUCCAGG	1454	CCTGGAGC A TCOCAGGC	2178
1713	CCCGCCUG CUGAUGAG X CGAA IAUUCUCC	1455	GGAGCATC C CAGCGGG	2179
1714	GCCTGCCU CUGAUGAG X CGAA IGAUGGUC	1456	GAGCATCC C AGCGGGC	2180
1715	CGCCCGCC CUGAUGAG X CGAA IGGAGGCU	1457	AGCATCCC A GCGGGCG	2181
1726	GUUCGGCG CUGAUGAG X CGAA ICCGCCCC	1458	CGGCGGCG A CGCCAGAC	2182
1730	GGCUGUCU CUGAUGAG X CGAA ICGUGCCG	1459	CGGCAGGC C AGACAGCC	2183
1731	GGGUGGUC CUGAUGAG X CGAA ICGUGGCC	1460	GGCAGGCC A GACAGCCC	2184
1735	GGGGGGCG CUGAUGAG X CGAA IUUCGGCG	1461	CGCCAGAC A GCOCCCCC	2185
1738	AAGGGGGG CUGAUGAG X CGAA ICGUGGUC	1462	CAGACAGC C CCCCCTT	2186
1739	CAAGGGGG CUGAUGAG X CGAA ICGUGUCU	1463	AGACAGCC C CCCCCTT	2187
1740	UCAAGGGG CUGAUGAG X CGAA IGGGUGUC	1464	GACAGCCC C CCCCCTT	2188
1741	IUCAAGGG CUGAUGAG X CGAA IGGGUGU	1465	ACAGCCCC C CCCTTGAA	2189
1742	AUUCAGGG CUGAUGAG X CGAA IGGGUGU	1466	CAGCCCCC C CTTGAAT	2190
1743	GAUUCNAG CUGAUGAG X CGAA IGGGGGCU	1467	AGCCCCCC C CTTGAAT	2191
1744	AGAUAUCAA CUGAUGAG X CGAA IGGGGGCG	1468	GGCCCCCC C TTGAATCT	2192
1745	CAGAUAUA CUGAUGAG X CGAA IGGGGGGG	1469	CCCCCCCC T TGAATCTG	2193
1752	CUCCUGGC CUGAUGAG X CGAA IAUUCAAG	1470	CTTGAATC T GCAGGAG	2194
1755	IUGUCUCC CUGAUGAG X CGAA ICAGUAUC	1471	GAATCTGC A GGGAGCAA	2195
1762	UGGAGAGU CUGAUGAG X CGAA ICUCCGUG	1472	CAGGGAGC A ACTCTCCA	2196
1765	GAGUGGAG CUGAUGAG X CGAA IUUGGUCU	1473	GGAGCAAC T CTCACATC	2197
1767	UGGAGUGG CUGAUGAG X CGAA IAGUUGCU	1474	AGCAACTC T CCACTCCA	2198
1769	UAUGGAGU CUGAUGAG X CGAA IAGAGUUG	1475	CAACTCTC C ACTCCATA	2199

Table 4

1770	AUAUGGAG	CUGAUGAG	X	CGAA	IGAGAGUU	1476	AACCTCC A	CTCCATAT	2200
1772	AAUAUUGG	CUGAUGAG	X	CGAA	IUGGAGAG	1477	CTCTCCAC	T CCATATTT	2201
1774	AUAAUAU	CUGAUGAG	X	CGAA	IAGUGGAG	1478	CTCCACTC	C ATATTTAT	2202
1775	AAUAAUA	CUGAUGAG	X	CGAA	IGAGUGGA	1479	TCCTACTC	A TATTTAT	2203
1789	GAUAAAAU	CUGAUGAG	X	CGAA	IUUUAAU	1480	ATTTAAAC	A ATTTTTC	2204
1798	GCCUUUGG	CUGAUGAG	X	CGAA	IAAAAAU	1481	ATTTTTTC	C CCAAGGC	2205
1799	UGCCUUUG	CUGAUGAG	X	CGAA	IGAAAAA	1482	TTTTTCCC	C CAAAGGCA	2206
1800	AUGCCUUU	CUGAUGAG	X	CGAA	IGAAAAA	1483	TTTTTCCC	C AAAGGCAT	2207
1801	GAUGCCUU	CUGAUGAG	X	CGAA	IGGAAAA	1484	TTTTCCCC	A AAGGCATC	2208
1807	ACUAUGGA	CUGAUGAG	X	CGAA	ICCUUUGG	1485	CCAAAGGC	A TCCATAGT	2209
1810	UGCACUAU	CUGAUGAG	X	CGAA	IAGGCCUU	1486	AAGGCATC	C ATAGTGCA	2210
1811	GUGCACUA	CUGAUGAG	X	CGAA	IAGGCCUU	1487	AAGGCATC	A TAGTGAC	2211
1818	AAUGCUAG	CUGAUGAG	X	CGAA	ICACUAUG	1488	CATAGTGC	A CTAGCATT	2212
1820	AAAAUGCU	CUGAUGAG	X	CGAA	IUGCACUA	1489	TAGTGTGC	T AGCATTTT	2213
1824	CAAGAAAA	CUGAUGAG	X	CGAA	ICUAGUGC	1490	GCATAGAC	A TTTTCTTG	2214
1830	UUGGUUCA	CUGAUGAG	X	CGAA	IAAAAUUC	1491	GCATTTTC	T TGAACCAA	2215
1836	ACAUAUUA	CUGAUGAG	X	CGAA	IUUCAAAG	1492	TCTTGAAC	C AATAATGT	2216
1837	UACUAUUA	CUGAUGAG	X	CGAA	IUGUCAAG	1493	CTTGAACC	A ATAATGTA	2217
1864	UGCAAGGC	CUGAUGAG	X	CGAA	IACAUCAA	1494	TGATGTGC	A GCCTTGCA	2218
1867	UGAUGCAA	CUGAUGAG	X	CGAA	IUGGACAU	1495	ATGTGATC	C TTGATACA	2219
1868	UGAUGCAA	CUGAUGAG	X	CGAA	IGCUGACA	1496	TGTGAGCC	T TGCATCAA	2220
1872	GCCCUUGA	CUGAUGAG	X	CGAA	ICAAAGGU	1497	AGCCTTGC	A TCAAGGCC	2221
1875	AAAGCCCU	CUGAUGAG	X	CGAA	IAGUCAAG	1498	CTTGTATC	A AGGGCTTT	2222
1881	UUUGAUAA	CUGAUGAG	X	CGAA	ICCCUUGA	1499	TCAAAGGC	T TTATCAA	2223
1887	GUACUUUU	CUGAUGAG	X	CGAA	IAUAAAGC	1500	GCTTTATC	A AAAAGTAC	2224
1896	UUUAUUUA	CUGAUGAG	X	CGAA	IUACUUUU	1501	AAAAGTAC	A ATAATAAA	2225
1907	CUACCUUA	CUGAUGAG	X	CGAA	IAUUUAUU	1502	AATAAATC	C TCAGGTAG	2226
1908	ACUACCUU	CUGAUGAG	X	CGAA	IUAUUUAU	1503	ATAAATCC	T CAGGTAGT	2227
1910	GUACUACC	CUGAUGAG	X	CGAA	IAGGAUUU	1504	AAATCCCT	A GGTAGTAC	2228
1919	CCAUUCCC	CUGAUGAG	X	CGAA	IUACUACC	1505	GGTAGTAC	T GGAATGG	2229
1933	CAUGGCAA	CUGAUGAG	X	CGAA	ICCUUCCA	1506	TGGAAGGC	T TTGCCATG	2230
1938	AGGCCCAU	CUGAUGAG	X	CGAA	ICAAAGCC	1507	GGCTTTGC	C ATGGGCCCT	2231
1939	CAGGCCCA	CUGAUGAG	X	CGAA	IGCAAAGC	1508	GCTTTGCC	A TGGGCCCT	2232
1945	ACGAGGCA	CUGAUGAG	X	CGAA	ICCAUUGG	1509	CCATGGGC	C TGCTGCGT	2233
1946	GACGAGGC	CUGAUGAG	X	CGAA	IGCCCAUG	1510	CATGGGCC	T GCTGCGTC	2234
1949	UCUGAGGC	CUGAUGAG	X	CGAA	ICAGGCCC	1511	GGGCTGTC	T GCGTCAGA	2235
1955	UACUGGUC	CUGAUGAG	X	CGAA	IACGCAGC	1512	GCTGCGTC	A GACCAGTA	2236
1959	CCAGUACU	CUGAUGAG	X	CGAA	IUCUGAGC	1513	CGTCAGAC	C AGTACTGG	2237
1960	CCCAGUAC	CUGAUGAG	X	CGAA	IGUCUGAC	1514	GTCAAGCC	A GTACTGGG	2238
1965	UCCUJCCC	CUGAUGAG	X	CGAA	IUACUGGU	1515	ACCATGAC	T GGAAGGGA	2239
1988	AUAACAAC	CUGAUGAG	X	CGAA	ICUACAAC	1516	TTGTAAGC	A GTTGTAT	2240
2032	UAUAGCAU	CUGAUGAG	X	CGAA	IUUCUAUC	1517	GATGAATC	A ATGCTATA	2241
2037	UAUAUUUA	CUGAUGAG	X	CGAA	ICAUUGUU	1518	AACAATGC	T ATAATATA	2242
2054	UACCCAAC	CUGAUGAG	X	CGAA	IUUCAUUA	1519	TAATGAAC	A CGTGGGTA	2243
2076	UACAUCAC	CUGAUGAG	X	CGAA	IUUUCUUA	1520	TAAGAACC	A TGATGTGA	2244
2091	CGGGACAA	CUGAUGAG	X	CGAA	IUAUUCUC	1521	GAGATTAC	T TTGTCCCG	2245
2097	AAUAAGCG	CUGAUGAG	X	CGAA	IACAAAGU	1522	ACTTTGTC	C CGCTTATT	2246

Table 4

2098	GAUAAGC	CUGAUGAG	X	CGAA	IGACAAAG	1523	CTTTGTCC	C	GCTTATTC	2247
2101	GCAGAAUA	CUGAUGAG	X	CGAA	ICGGGACA	1524	TGTCCCGC	T	TATCTTCG	2248
2107	CAGGAGC	CUGAUGAG	X	CGAA	IAAUAAGC	1525	GCTTATTC	T	GCTCCCTG	2249
2110	UACAGGG	CUGAUGAG	X	CGAA	ICAGAAUA	1526	TATCTTCG	T	CCCTGTTA	2250
2112	GAUAAACAG	CUGAUGAG	X	CGAA	IAGCAGAA	1527	TTCTGCTC	C	CTGTTATC	2251
2113	AGAUAAAC	CUGAUGAG	X	CGAA	IGAGCAGA	1528	TCTGCTCC	C	TGTTATCT	2252
2114	CAGUAAC	CUGAUGAG	X	CGAA	IGGAGCAG	1529	CTGCTCCC	T	GTATTCTG	2253
2121	GAUCUAGC	CUGAUGAG	X	CGAA	IAUAAACAG	1530	CTGTTATC	T	GCTAGATC	2254
2124	CUAGAUCU	CUGAUGAG	X	CGAA	ICAGAUAA	1531	TTATCTGC	T	AGATCTAG	2255
2130	UGAGAACU	CUGAUGAG	X	CGAA	IAUCUAGC	1532	GCTAGATC	T	AGTTCTCA	2256
2136	AGUGAUG	CUGAUGAG	X	CGAA	IAACUAGA	1533	TCTAGTTC	T	CAATCACT	2257
2138	GCAGUGAU	CUGAUGAG	X	CGAA	IAGAUCTA	1534	TAGTTCCT	A	ATCACTGC	2258
2142	GGGAGCAG	CUGAUGAG	X	CGAA	IAUUGAGA	1535	TCTCAATC	A	CTGCTCCC	2259
2144	GGGGAGC	CUGAUGAG	X	CGAA	IUGAUUGA	1536	TCAATCAC	T	GCTTCCCC	2260
2147	CACGGGG	CUGAUGAG	X	CGAA	ICAGUGAU	1537	ATCACTGC	T	CCCCGGTG	2261
2149	CACACGG	CUGAUGAG	X	CGAA	IAGCAGUG	1538	CACTGCTC	C	CCCGTGTG	2262
2150	ACACACGG	CUGAUGAG	X	CGAA	IGAGCAGU	1539	ACTGCTCC	C	CGTGTGTG	2263
2151	UACACACG	CUGAUGAG	X	CGAA	IGGAGCAG	1540	CTGCTCCC	C	CGTGTGTA	2264
2152	AUACACAC	CUGAUGAG	X	CGAA	IGGGAGCA	1541	TGCTCCCC	C	GTGTGTAT	2265
2169	ACCUUACA	CUGAUGAG	X	CGAA	ICAUUCUA	1542	TAGAATGC	A	TGTAAAGT	2266
2179	ACACAAGA	CUGAUGAG	X	CGAA	IACCUUAC	1543	GTAAAGTC	T	TCTTGTGT	2267
2182	AGGACACA	CUGAUGAG	X	CGAA	IAAGACCU	1544	AGGTCTTC	T	TGTGTCTT	2268
2189	UUUCAUCA	CUGAUGAG	X	CGAA	IACACAAG	1545	CTGTGTTC	C	TGATGAAA	2269
2190	UUUCUACU	CUGAUGAG	X	CGAA	IGACACAA	1546	TTGTGTCC	T	GATGAAAA	2270
2207	UCAUUCUA	CUGAUGAG	X	CGAA	ICACAUUA	1547	ATATGTGC	T	TAAATAGA	2271
2221	GAGAUCAA	CUGAUGAG	X	CGAA	IUUUCUCA	1548	TGAGAAAC	T	TTGATCTC	2272
2228	GUAAAGCAG	CUGAUGAG	X	CGAA	IAUCAAAG	1549	CTTGTATC	T	CTGCTTAC	2273
2230	UAGUAAGC	CUGAUGAG	X	CGAA	IAGAUCAA	1550	TTGATCTC	T	GCTTACTA	2274
2233	CAUUAUGA	CUGAUGAG	X	CGAA	ICAGAGAU	1551	ATCTCTGC	T	TACTAATG	2275
2237	GGCAUUAU	CUGAUGAG	X	CGAA	IUAAGCAG	1552	CTGCTTAC	T	AATGTGCC	2276
2245	GGACAUGG	CUGAUGAG	X	CGAA	ICACAUUA	1553	TAATGTGC	C	CAATGTCC	2277
2246	UGGACAUG	CUGAUGAG	X	CGAA	IGCAUAUU	1554	AATGTGCC	C	CATGTCCA	2278
2247	UUGGACAU	CUGAUGAG	X	CGAA	IGGCACAU	1555	ATGTGCCC	C	ATGTCCAA	2279
2248	CUUGGACA	CUGAUGAG	X	CGAA	IGGGCACA	1556	TGTGCCCC	A	TGTCACAG	2280
2253	UUGGACUU	CUGAUGAG	X	CGAA	IACAUUGG	1557	CCATGTGC	C	AAGTCCAA	2281
2254	GUUGGACU	CUGAUGAG	X	CGAA	IGACAUGG	1558	CCATGTGC	A	AGTCCAAC	2282
2259	GGCAGGUU	CUGAUGAG	X	CGAA	IACUUGGA	1559	TCCAAGTC	C	AACTGTCC	2283
2260	AGCAGGUU	CUGAUGAG	X	CGAA	IGACUUGG	1560	CCAAGTCC	A	AACTGTCT	2284
2263	CACAGGCA	CUGAUGAG	X	CGAA	IUUGGACU	1561	AGTCCAAC	C	TGCTGTGT	2285
2264	GACAGGC	CUGAUGAG	X	CGAA	IGUUGGAC	1562	GTCCAACT	T	GCTGTGTC	2286
2267	CAUGGACA	CUGAUGAG	X	CGAA	ICAGGUUG	1563	CAACTGTC	C	TGTGATGA	2287
2268	CAUGGCAC	CUGAUGAG	X	CGAA	IGCAGGUU	1564	AACTGTCC	T	GTGCACTG	2288
2273	UCAGGUCA	CUGAUGAG	X	CGAA	ICACAGGC	1565	GCCTGTGC	A	TGACCTGA	2289
2278	AAUGAUCA	CUGAUGAG	X	CGAA	IUCAUGCA	1566	TGATGATC	C	TGATCATT	2290
2279	UAUGAUUC	CUGAUGAG	X	CGAA	IGUCAUGC	1567	GCATGACC	T	TGATATTA	2291
2284	CCAUGUAA	CUGAUGAG	X	CGAA	IAUCAGGU	1568	ACCTGATC	A	TTACATGG	2292
2289	CACAGCCA	CUGAUGAG	X	CGAA	IUAUAGAU	1569	ATCATTAC	A	TGGCTGTG	2293

Table 4

2294	GGAACCAC	CUGAUGAG	X	CGAA	ICCAUGUA	1570	TACATGGC	T	GTGGTTCC	2294
2302	CAGGCUUA	CUGAUGAG	X	CGAA	IAACCACA	1571	TGTGGTTC	C	TAAGCCTG	2295
2303	ACAGGCTU	CUGAUGAG	X	CGAA	IGAACCAC	1572	GTGGTTCC	T	AAGCCTGT	2296
2308	CAGCAACA	CUGAUGAG	X	CGAA	ICUUAAGGA	1573	TCCTAAGC	C	TGTTGCTG	2297
2309	UCAGCAAC	CUGAUGAG	X	CGAA	IGCUUAGG	1574	CCTAAGCC	T	GTGCTGA	2298
2315	AUGACUUC	CUGAUGAG	X	CGAA	ICAAACAGG	1575	CCTGTTGC	T	GAAGTCAT	2299
2322	AGCGACAA	CUGAUGAG	X	CGAA	IACUUCAG	1576	CTGAAGTC	A	TGTGCGT	2300
2330	UAUUGCUG	CUGAUGAG	X	CGAA	ICGACAAU	1577	ATTGTCGC	T	CAGCAATA	2301
2332	CCUAUUGC	CUGAUGAG	X	CGAA	IAGGACAA	1578	TGTGCGTC	A	GCAATAGG	2302
2335	CACCCUUA	CUGAUGAG	X	CGAA	ICUGAGCG	1579	CGCTCAGC	A	ATAGGGTG	2303
2345	UGGAAAC	CUGAUGAG	X	CGAA	ICACCUUA	1580	TAGGGTGC	A	GTTTCCA	2304
2352	CUAUUCCU	CUGAUGAG	X	CGAA	IAAAACUG	1581	CAGTTCCT	C	AGGAATAG	2305
2353	CCUAUUC	CUGAUGAG	X	CGAA	IGAAAACU	1582	AGTTTTC	A	GGAATAGG	2306
2363	UAGGCRAA	CUGAUGAG	X	CGAA	ICCUAUUC	1583	GAATAGGC	A	TTTGCTTA	2307
2369	AGGAUUA	CUGAUGAG	X	CGAA	ICAAUAGC	1584	GCATTTC	C	TAATTCCT	2308
2370	CAGGAUU	CUGAUGAG	X	CGAA	IGCAAUUG	1585	CATTTCGC	T	AATTCCTG	2309
2376	UCAUGCCA	CUGAUGAG	X	CGAA	IAAUUAGG	1586	CCTAATTC	C	TGGCATGA	2310
2377	GUCAUGCC	CUGAUGAG	X	CGAA	IGAAUUAU	1587	CTAATTC	T	GGCATGAC	2311
2381	GAGUGUCA	CUGAUGAG	X	CGAA	ICCAAGAA	1588	TTCTTGGC	A	TGACACTC	2312
2386	CCUAGAG	CUGAUGAG	X	CGAA	IUCUAGCC	1589	GGCATGAC	A	CTCTAGTG	2313
2388	GUCAUAG	CUGAUGAG	X	CGAA	IUGUCAUG	1590	CATGACAT	T	CTAGTACG	2314
2390	AAGUCACU	CUGAUGAG	X	CGAA	IAGUGUCA	1591	TGACACTC	T	AGTGAATT	2315
2397	CACCAAGA	CUGAUGAG	X	CGAA	IUCACUAG	1592	CTAGTAGC	T	TCCTGGTG	2316
2400	CCUCACCA	CUGAUGAG	X	CGAA	IAAGUCAC	1593	GTGACTTC	C	TGGTGAGG	2317
2401	GCCUCACC	CUGAUGAG	X	CGAA	IGAAGUCA	1594	TGACTTTC	T	GGTGAGGC	2318
2410	ACAGGCGU	CUGAUGAG	X	CGAA	ICCUACAC	1595	GGTGAGGC	C	CAGCCTGT	2319
2411	GACAGGCU	CUGAUGAG	X	CGAA	IGCCUCAC	1596	GTGAGGCC	C	AGCCTGTC	2320
2412	GGACAGGC	CUGAUGAG	X	CGAA	IGGCCUCA	1597	TGAGGCC	A	GCCTGTCC	2321
2415	CCAGGACA	CUGAUGAG	X	CGAA	ICUGGGCC	1598	GGCCAGGC	C	TGTCTTGG	2322
2416	ACCAGGAC	CUGAUGAG	X	CGAA	IGCUUGGC	1599	GCCAGGCC	T	GTCTGGTG	2323
2420	CUGUACCA	CUGAUGAG	X	CGAA	IACAGGCU	1600	AGCCTGTC	C	TGGTACAG	2324
2421	GCUGUACC	CUGAUGAG	X	CGAA	IGACAGGC	1601	GCCTGTCC	T	GGTACAGC	2325
2427	GACCCUGC	CUGAUGAG	X	CGAA	IUACACAGG	1602	CCTGGTAC	A	GCAGGGTC	2326
2430	CAGACCCC	CUGAUGAG	X	CGAA	ICUGUACC	1603	GGTACAGC	A	GGGTCTTG	2327
2436	UUCACGCA	CUGAUGAG	X	CGAA	IACCCUGC	1604	GCAGGGTC	T	TGCTGTAA	2328
2440	UAGGUUAC	CUGAUGAG	X	CGAA	ICAAAGACC	1605	GGTCTTGC	T	GTAACCTA	2329
2446	AAUGUCUG	CUGAUGAG	X	CGAA	IUAUACAGC	1606	GCTGTAACT	T	CAGACATT	2330
2448	GGAAUGUC	CUGAUGAG	X	CGAA	IAGUUAJCA	1607	TGTAACTC	A	GACATTCC	2331
2452	CCUUGGAA	CUGAUGAG	X	CGAA	IUCUGAGU	1608	ACTCAGAC	A	TTCCAAAG	2332
2456	AUACCCUU	CUGAUGAG	X	CGAA	IAAUGUCU	1609	AGACATTCT	C	AAGGGTAT	2333
2457	CAUACCCU	CUGAUGAG	X	CGAA	IGAAUGUC	1610	GACATTCC	A	AGGATATG	2334
2472	GAUAUAU	CUGAUGAG	X	CGAA	ICUUCCCA	1611	TGGAAGGC	C	ATATTAC	2335
2473	UGUGAAUA	CUGAUGAG	X	CGAA	IGCUUCCC	1612	GGGAAGCC	A	TATTACA	2336
2479	GUGAGGUG	CUGAUGAG	X	CGAA	IAAUAUGG	1613	CCATATTC	A	CACCTCAC	2337
2481	GGUGAGG	CUGAUGAG	X	CGAA	IUGAAUAU	1614	ATATTAC	A	CCTCAGC	2338
2483	GAGCGUGA	CUGAUGAG	X	CGAA	IUGUGAAU	1615	ATTCACAC	C	TCACGCTC	2339
2484	AGAGCGUG	CUGAUGAG	X	CGAA	IUGUGAAU	1616	TTACACCT	T	CACGCTCT	2340

Table 4

2486	CCAGAGCG	CUGAUGAG	X	CGAA	IAGGUGUG	1617	CACACCTC	A	CGCTCTGG	2341
2490	AUGUCCAG	CUGAUGAG	X	CGAA	ICGUGAGG	1618	CCTCACGC	T	CTGGACAT	2342
2492	UCAUUGCC	CUGAUGAG	X	CGAA	IAGCGUGA	1619	TCACGCTC	T	GGACATGA	2343
2497	CUAAAUCA	CUGAUGAG	X	CGAA	IUCCAGAG	1620	CTCTGGAC	A	TGATTGAG	2344
2512	GGUGUCCC	CUGAUGAG	X	CGAA	ICUUCOCU	1621	AGGGAAGC	A	GGGACACC	2345
2518	GGGGGGGG	CUGAUGAG	X	CGAA	IUCCGUGC	1622	GCAGGGAC	A	CCCCCGCC	2346
2520	GGGGGGGG	CUGAUGAG	X	CGAA	IUGUCCUC	1623	AGGGACAC	C	CCCCGGCC	2347
2521	GGGGGGGG	CUGAUGAG	X	CGAA	IUGUCCUC	1624	GGGACACC	C	CCCCGGCC	2348
2522	GGGGGGGG	CUGAUGAG	X	CGAA	IGGUGUCC	1625	GGACACCC	C	CCCCGGCC	2349
2523	GGGGGGGG	CUGAUGAG	X	CGAA	IGGUGUCC	1626	GACACCCC	C	CGCCCCCC	2350
2524	UGGGGGGG	CUGAUGAG	X	CGAA	IGGGGUGU	1627	ACACCCCC	C	GGCCCCCA	2351
2527	AGGUGGGG	CUGAUGAG	X	CGAA	ICGUGGGG	1628	CCCCCGCC	C	CCCCACCT	2352
2528	AAGGUGGG	CUGAUGAG	X	CGAA	IGCGGGGG	1629	CCCCCGCC	C	CCCCACCT	2353
2529	AAAGGUGG	CUGAUGAG	X	CGAA	IGCGGGGG	1630	CCCCCGCC	C	CCCCACCT	2354
2530	CAAAGGUG	CUGAUGAG	X	CGAA	IGGGCGGG	1631	CCCCCGCC	C	CACCTTTG	2355
2531	CCAAGGUG	CUGAUGAG	X	CGAA	IGGGCGGG	1632	CCCCCGCC	C	ACCTTTGG	2356
2532	CCCAAAGG	CUGAUGAG	X	CGAA	IGGGCGGG	1633	GGCCCCCC	A	CCTTTGGG	2357
2534	AUCCCAAA	CUGAUGAG	X	CGAA	IUGGGGGG	1634	CCCCCGCC	C	TTTGGGAT	2358
2535	GAUCCCAA	CUGAUGAG	X	CGAA	IUGGGGGG	1635	CCCCCGCC	T	TTGGGATC	2359
2544	GGGGGGGG	CUGAUGAG	X	CGAA	IAUCCCAA	1636	TTGGGATC	A	GCTTCCGC	2360
2547	AUGGCGGA	CUGAUGAG	X	CGAA	ICUGAUCC	1637	GGATCAGC	C	TCGGCATC	2361
2548	AAUGGCGG	CUGAUGAG	X	CGAA	IGCUGAUC	1638	GATCAGCC	T	CGCCATT	2362
2550	GGAUUGGC	CUGAUGAG	X	CGAA	IAGGCUGA	1639	TCAGCCTC	C	GCCATTCC	2363
2553	CUUGGAAU	CUGAUGAG	X	CGAA	ICGAGGAC	1640	GCTTCCGC	C	ATTCCAAG	2364
2554	ACUUGGAA	CUGAUGAG	X	CGAA	IGCGGAGG	1641	CCTCCGCC	A	TTCCAAGT	2365
2558	GUCGACUU	CUGAUGAG	X	CGAA	IAAUGGCG	1642	CGCCATTG	C	AAGTCGAC	2366
2559	UGUGGACU	CUGAUGAG	X	CGAA	IGAUGGCG	1643	GCCATTCC	A	AGTCGACA	2367
2567	AAGAAGAG	CUGAUGAG	X	CGAA	IUCGACUU	1644	AAGTCGAC	A	CTCTTCTT	2368
2569	UCAAGAAG	CUGAUGAG	X	CGAA	IUGUCGAC	1645	GTGACGAC	T	CTTCTTGA	2369
2571	GCUCAAGA	CUGAUGAG	X	CGAA	IAGUGUGC	1646	CGACACTC	T	CTTTGAGC	2370
2574	UCUGCUCA	CUGAUGAG	X	CGAA	IAAGAGUG	1647	CACCTCTT	T	TGAGCAGA	2371
2580	UCACGGUC	CUGAUGAG	X	CGAA	ICUCAAGA	1648	CTTTGAGC	A	GACCGTGA	2372
2584	CAAAUACAC	CUGAUGAG	X	CGAA	IUCUGCUC	1649	GAGCAGAC	C	GTGATTGG	2373
2603	CAACGAGG	CUGAUGAG	X	CGAA	ICCUUCUC	1650	AGAGAGGC	A	CCTGCTGG	2374
2605	UUCCAGCA	CUGAUGAG	X	CGAA	IUCGUCUC	1651	AGAGGACG	C	TGCTGGAA	2375
2606	UUUCCAGC	CUGAUGAG	X	CGAA	IUGGUCUC	1652	GAGGACCT	T	GCTGGAAA	2376
2609	UGGUUUCC	CUGAUGAG	X	CGAA	ICAGGUGC	1653	GCACCTGC	T	GGAAACCA	2377
2616	AGAAGUGU	CUGAUGAG	X	CGAA	IUUUCCAG	1654	CTGGAAGC	C	ACACTTCT	2378
2617	AAGAAGUG	CUGAUGAG	X	CGAA	IUUUCCAA	1655	TGGAUAAC	A	CACCTTCT	2379
2619	UCAAGAAG	CUGAUGAG	X	CGAA	IUGGUUUC	1656	GAUAACCA	A	CTTCTTGA	2380
2621	UUUCAAGA	CUGAUGAG	X	CGAA	IUGGUUUC	1657	AACACACG	T	TCTTGAAG	2381
2624	CUGUUUCA	CUGAUGAG	X	CGAA	IAAGUGUG	1658	CACACTTC	T	TGAACAGG	2382
2631	ACCCAGGC	CUGAUGAG	X	CGAA	IUUUCAAG	1659	CTTGAAGC	A	GCTTGGGT	2383
2634	GUACACCA	CUGAUGAG	X	CGAA	ICUGUUUC	1660	GAACAGGC	C	TGGGTGAC	2384
2635	CGUACCCC	CUGAUGAG	X	CGAA	IGCUGUUC	1661	AAACAGGC	T	GGGTGAGC	2385
2647	UGCCUAAA	CUGAUGAG	X	CGAA	IACCGUCA	1662	TGACGGTC	C	TTTAGGCA	2386
2648	CUGCCUAA	CUGAUGAG	X	CGAA	IGACCGUC	1663	GACGGTCC	T	TTAGGCAG	2387

Table 4

2655	CGGCAGGC	CUGAUGAG	X	CGAA	ICCUAAAG	1664	CTTTAGGC	A	GCGTCCGC	2388
2658	CGCGCGCA	CUGAUGAG	X	CGAA	ICUGCCUA	1665	TAGGCAGC	C	TGCGCGCG	2389
2659	ACGGCGGC	CUGAUGAG	X	CGAA	IGCUCCU	1666	AGGCAGCC	T	GCCGCCGT	2390
2662	GAGACGGC	CUGAUGAG	X	CGAA	ICAGGCG	1667	CAGCCTGC	C	GCGCTCTC	2391
2665	ACAGAGAC	CUGAUGAG	X	CGAA	ICGGCAGG	1668	CTGTCCGC	C	GTCCTGT	2392
2669	CGGACAG	CUGAUGAG	X	CGAA	IACGGCGG	1669	CCGCCCTC	T	CTGTCCCG	2393
2671	ACCGGGAC	CUGAUGAG	X	CGAA	IAGACGGC	1670	GCGCTCTC	T	GTCCCGGT	2394
2675	GUGAACCG	CUGAUGAG	X	CGAA	IACAGAGA	1671	TCTCTGTC	C	CGGTTTAC	2395
2676	GGUGAAC	CUGAUGAG	X	CGAA	IGACAGAG	1672	CTCTGTCC	C	GGTTTACC	2396
2682	CGGCAAGG	CUGAUGAG	X	CGAA	IAACCGGG	1673	CCGCTTTC	A	CTTTGCGC	2397
2684	CUCCGCAA	CUGAUGAG	X	CGAA	IUGAACCG	1674	CGGTTTAC	C	TGCGCGAG	2398
2685	UCUCGGCA	CUGAUGAG	X	CGAA	IUGUAACC	1675	GGTTTACC	T	TGCCGAGA	2399
2689	CCUCUCUC	CUGAUGAG	X	CGAA	ICAAGGUG	1676	CACCTTGC	C	GAGAGAGG	2400
2704	CGUGGGGC	CUGAUGAG	X	CGAA	IACGCGCC	1677	GGGCGCTC	T	GCCCCACC	2401
2707	GAGGGUGG	CUGAUGAG	X	CGAA	ICAGACGC	1678	GCGTCTGC	C	CCACCCTC	2402
2708	UGAGGGUG	CUGAUGAG	X	CGAA	IGCAGAGC	1679	CGTCTGCC	C	CACCCTCA	2403
2709	UUGAGGGU	CUGAUGAG	X	CGAA	IGGCAGAC	1680	GTCTGCCC	C	ACCCTCAA	2404
2710	UUUGAGGG	CUGAUGAG	X	CGAA	IUGGCGAG	1681	TCTGCCCC	A	CCCTCAAA	2405
2712	GGUUGGAG	CUGAUGAG	X	CGAA	IUGGGGCA	1682	TGCCCCAC	C	CTCAAAACC	2406
2713	GGGUUUGA	CUGAUGAG	X	CGAA	IUGGGGGC	1683	GCCCCACC	C	TCAAAACC	2407
2714	AGGGUUUG	CUGAUGAG	X	CGAA	IUGGGGGG	1684	CCCCACCC	T	CAAAACCT	2408
2716	ACAGGGUU	CUGAUGAG	X	CGAA	IAGGGGUG	1685	CCACCCTC	A	AACCTGT	2409
2720	CCCCACAG	CUGAUGAG	X	CGAA	IUUUGAGG	1686	CCCTAAAC	C	CTGTGGGG	2410
2721	GCCCCACA	CUGAUGAG	X	CGAA	IUUUGGAG	1687	CTCAACCC	C	TGTGGGGC	2411
2722	GGCCCCAC	CUGAUGAG	X	CGAA	IUUUGGAG	1688	TCAAAACC	T	GTGGGGCC	2412
2730	CACCAUCA	CUGAUGAG	X	CGAA	ICCCCCACA	1689	TGUGGGGC	C	TGATGGTG	2413
2731	GCACCAUC	CUGAUGAG	X	CGAA	IGCCCCAC	1690	GTGGGGCC	T	GATGGTGC	2414
2740	GAGUCGUG	CUGAUGAG	X	CGAA	ICACCAUC	1691	GATGGTGC	T	CACGACTC	2415
2742	AAGAGUCG	CUGAUGAG	X	CGAA	IAGCACCA	1692	TGTTGCTC	A	CGACTCTT	2416
2747	GCAGGAAG	CUGAUGAG	X	CGAA	IUCGUGAG	1693	CTCACGAC	T	CTTCTCTG	2417
2749	UUGCAGGA	CUGAUGAG	X	CGAA	IAGUCGUG	1694	CACGACTC	T	TCCTGCAA	2418
2752	CCUUGGCA	CUGAUGAG	X	CGAA	IAGAGGUC	1695	GACTCTTC	C	TGCAAGGG	2419
2753	CCCUUGGC	CUGAUGAG	X	CGAA	IGAAGAGU	1696	ACTCTTCC	T	GCAAAAGG	2420
2756	GUUCCCUU	CUGAUGAG	X	CGAA	ICAGGAAG	1697	CTTCTCTG	A	AAGGGAAC	2421
2755	AGGUCUUC	CUGAUGAG	X	CGAA	IUUCUUCU	1698	AAAGGAAC	T	GAAAGACT	2422
2772	AAUGUGGA	CUGAUGAG	X	CGAA	IUCUUCAG	1699	CTGAAGAC	C	TCCACATT	2423
2773	UAUUGUGG	CUGAUGAG	X	CGAA	IGUCUUCA	1700	TGAAGACC	T	CCACATTA	2424
2775	CUUAUUGU	CUGAUGAG	X	CGAA	IAGGUCUU	1701	AAGACCTC	C	ACATTAA	2425
2776	ACUUAUUG	CUGAUGAG	X	CGAA	IGAGGUCU	1702	AGACCTCC	A	CATTAAAT	2426
2778	CCACUUAU	CUGAUGAG	X	CGAA	IUGGAGGU	1703	ACCTCCAC	A	TTAAGTGG	2427
2788	UGUUAAAA	CUGAUGAG	X	CGAA	ICCAUUUA	1704	TAAGTGGC	T	TITTAACA	2428
2796	GUUUUUAU	CUGAUGAG	X	CGAA	IUUAAAAA	1705	TTTTTAAAC	A	TGAAAAAC	2429
2805	ACGUGCCG	CUGAUGAG	X	CGAA	IUUUUUUA	1706	TGAAAAAC	A	CGGCAACT	2430
2810	CGUACAGC	CUGAUGAG	X	CGAA	ICCGUGUU	1707	AACGCGGC	A	GCTGTAGC	2431
2813	GGAGCUAC	CUGAUGAG	X	CGAA	ICUGCCGU	1708	ACGCGACT	T	GTAGCTCC	2432
2819	AGCUCGGG	CUGAUGAG	X	CGAA	ICUACAGC	1709	GCTGTAGT	C	CCCAGACT	2433
2821	GUAGCUCG	CUGAUGAG	X	CGAA	IAGCUACA	1710	TGTAGCTC	C	CGAGCTAC	2434

Table 4

2822	AGUAGCUC	CUGAUGAG	X	CGAA	IGAGCUAC	1711	GTAGCTCC	C	GAGCTACT	2435
2827	AAGAGAGU	CUGAUGAG	X	CGAA	ICUCGGGA	1712	TCCCAGGC	T	ACTCTCTT	2436
2830	GGCAAGAG	CUGAUGAG	X	CGAA	IUAGCUCG	1713	CGAGCTAC	T	CTCTTGCC	2437
2832	CUGGCAAG	CUGAUGAG	X	CGAA	IAGUAGCU	1714	AGCTACTC	T	CTTGCCAG	2438
2834	UGCUGGCA	CUGAUGAG	X	CGAA	IAGAGUAG	1715	CTACTCTC	T	TGCGAGCA	2439
2838	AAAAUGCU	CUGAUGAG	X	CGAA	ICAAAGAGA	1716	TCTCTTGC	C	AGCATTTT	2440
2839	GAAAUGC	CUGAUGAG	X	CGAA	IGCAAGAG	1717	CTCTTGCC	A	GCATTTTC	2441
2842	UGUGAAAA	CUGAUGAG	X	CGAA	ICUGGCAA	1718	TGCGCAGC	A	TTTTTACA	2442
2848	GCAAAUUG	CUGAUGAG	X	CGAA	IAAAUAGC	1719	GCATTTTC	A	CATTTTGC	2443
2850	AGGCAAAA	CUGAUGAG	X	CGAA	IUGAAAAU	1720	ATTTTCAC	A	TTTTGCCT	2444
2857	ACGAGAAA	CUGAUGAG	X	CGAA	ICAAAAUG	1721	CATTTTGC	C	TTTCTCGT	2445
2858	CACGAGAA	CUGAUGAG	X	CGAA	IGCAAAAU	1722	ATTTTGCC	T	TCTCTGIG	2446
2862	CUACCACG	CUGAUGAG	X	CGAA	IAAAGGCA	1723	TGCTTTTC	T	CGTGGTAG	2447
2875	UCUGUACU	CUGAUGAG	X	CGAA	ICUCUAC	1724	GTAGAAGC	C	AGTCAGAG	2448
2876	CUCUGUAC	CUGAUGAG	X	CGAA	IGCUUCUA	1725	TAGAAGCC	A	GTACAGAG	2449
2881	AAUUUCUC	CUGAUGAG	X	CGAA	IUACUGGC	1726	GCCAGTAC	A	GAGAAATT	2450
2891	CCCACAC	CUGAUGAG	X	CGAA	IAUUUCUC	1727	AGAAATTC	T	GTGTTGGG	2451
2903	ACCUCGAA	CUGAUGAG	X	CGAA	IUUCACAC	1728	GTGGGAAC	A	TTCGAGGT	2452
2915	CUGCAGGG	CUGAUGAG	X	CGAA	IACACCUC	1729	GAGGTGTC	A	CCCTGCAG	2453
2917	CUCUGCAG	CUGAUGAG	X	CGAA	IUGACACC	1730	GGTGTAC	C	CTGCAGAG	2454
2918	GCUCUGCA	CUGAUGAG	X	CGAA	IGUGACAC	1731	GTGTCACC	C	TGCGAGCT	2455
2919	AGCUCUGC	CUGAUGAG	X	CGAA	IGUGACAC	1732	TGTCACCC	T	GCAGAGTC	2456
2922	CAUAGCUC	CUGAUGAG	X	CGAA	ICAGGGUG	1733	CACCTTGC	A	GAGCTATG	2457
2927	CCACCAAU	CUGAUGAG	X	CGAA	ICUCUGCA	1734	TGCAAGGC	T	ATGTTAGG	2458
2949	GGCACCUA	CUGAUGAG	X	CGAA	ICCUUAUC	1735	GATAAGGC	T	TAGGTGCC	2459
2957	UACAGCCU	CUGAUGAG	X	CGAA	ICACCUGA	1736	TTAGGTGC	C	AGGCTGTA	2460
2958	UUACAGCC	CUGAUGAG	X	CGAA	IGCACCUGA	1737	TAGGTGCC	A	GGCTGTAA	2461
2962	AUGCUUAC	CUGAUGAG	X	CGAA	ICCUUGCA	1738	TGCGAGGC	T	GTAAGCAT	2462
2969	GCUCAGAA	CUGAUGAG	X	CGAA	ICUUAACG	1739	CTGTAAGC	A	TTCTGAGC	2463
2973	GCCAGCUC	CUGAUGAG	X	CGAA	IAUUGCUU	1740	AAGCATTC	T	GAGCTGGC	2464
2978	AACAGGCC	CUGAUGAG	X	CGAA	ICUCAGAA	1741	TTCTGAGC	T	GGCTTGTT	2465
2982	AAACAACA	CUGAUGAG	X	CGAA	ICCAGCUC	1742	GAGCTGGC	T	TGTTGTTT	2466
2998	CAUUAACA	CUGAUGAG	X	CGAA	IACUUAAA	1743	TTTAAGTC	C	TGATATAT	2467
2999	ACAUUAAC	CUGAUGAG	X	CGAA	IGACUAAA	1744	TTAAGTCC	T	GTATATGT	2468
3040	UUUUGAAA	CUGAUGAG	X	CGAA	ICUACUAA	1745	ATAGTAGC	A	TTTTCAAA	2469
3045	GUCCAUUU	CUGAUGAG	X	CGAA	IAAUUGCU	1746	AGCATTTT	A	AAATGGAC	2470
3058	GUUAAACC	CUGAUGAG	X	CGAA	IUACGUCC	1747	GGACGTAC	T	GTTTAAAC	2471
3067	GGAUAGGA	CUGAUGAG	X	CGAA	IUUAAACC	1748	GGTTTAAAC	C	TCCTATCC	2472
3068	AGGAUAGG	CUGAUGAG	X	CGAA	IGUUAAAC	1749	GTTTAAAC	T	CTATCTCT	2473
3070	CAAGGAUA	CUGAUGAG	X	CGAA	IAGGUUAA	1750	TTAACTTC	C	TATCTTTG	2474
3071	CCAAGGAU	CUGAUGAG	X	CGAA	IGAGGUUA	1751	TAACTCTC	T	ATCTCTGG	2475
3075	CUCCUCAA	CUGAUGAG	X	CGAA	IAUAGGAG	1752	CTCTTATC	C	TGAGAGAG	2476
3076	GCUCUCAA	CUGAUGAG	X	CGAA	IGAUAGGA	1753	TCCTATCC	T	TGAGAGAG	2477
3085	GAGGCAGC	CUGAUGAG	X	CGAA	ICUCUCAA	1754	TGAGAGAG	A	GCTGGCTC	2478
3088	GGAGAGCC	CUGAUGAG	X	CGAA	ICUGUCUC	1755	AGAGAGGC	T	GGCTCTCC	2479
3092	AGGUGGAG	CUGAUGAG	X	CGAA	ICCAGCUG	1756	CAGCTGGC	T	CTCCACCT	2480
3094	CAAGGUGG	CUGAUGAG	X	CGAA	IAGCCAGC	1757	GCTGGCTC	T	CCACCTTG	2481

Table 4

3096	AACAAGGU CUGAUGAG X CGAA TAGAGCCA	1758	TGGCTCTC C ACCTTGTT	2482
3097	UAACAAGG CUGAUGAG X CGAA IGAGAGCC	1759	GGCTCTCC A CCTTGTTA	2483
3099	UGUAACAA CUGAUGAG X CGAA IUGGAGAG	1760	CTCTCCAC C TTGTTACA	2484
3100	GUGUAACA CUGAUGAG X CGAA IGUGGAGA	1761	TCTCCACC T TGTACAC	2485
3107	ACAUAUUG CUGAUGAG X CGAA IUAACAAG	1762	CTTGTTAC A CATTATGT	2486
3109	UACAUAUA CUGAUGAG X CGAA IUGUAACA	1763	TGTTACAC A TTATGTTA	2487
3132	AGCAGAGC CUGAUGAG X CGAA ICUCGCUA	1764	TAGCGAGC T GCTCTGCT	2488
3135	CAUAGCAG CUGAUGAG X CGAA ICAGCUCG	1765	CGAGCTGC T CTGCTATG	2489
3137	GACAUAGC CUGAUGAG X CGAA IAGCAGCU	1766	AGCTGCTC T GCTATGTC	2490
3140	AAGGACAU CUGAUGAG X CGAA ICAGAGCA	1767	TGCTCTGC T ATGCTCTT	2491
3146	UGGCUUAA CUGAUGAG X CGAA TACAUAGC	1768	GCTATGTC C TTAAGCCA	2492
3147	UUGGCUUA CUGAUGAG X CGAA TGACAUAG	1769	CTATGCTC T TAAGCCAA	2493
3153	UAAAUUUV CUGAUGAG X CGAA ICUUAAGG	1770	CCTTAAGC C AATRTTTA	2494
3154	GUAAAUU CUGAUGAG X CGAA IGCUUAAG	1771	CTTAAGCC A ATATTAC	2495
3163	ACCUGAUG CUGAUGAG X CGAA IUAAAUU	1772	ATATTAC T CATCAGGT	2496
3165	UGACCUGA CUGAUGAG X CGAA TAGUAAU	1773	ATTACTC A TCAGGTCA	2497
3168	UAAUGACC CUGAUGAG X CGAA IAUAGUA	1774	TACTCATC A GGTCATTA	2498
3173	AAAAUAUA CUGAUGAG X CGAA IACCUGAU	1775	ATCAGGTC A TTATTTT	2499
3185	AUGGCCAU CUGAUGAG X CGAA UAAAAA	1776	TTTTTTAC A ATGCCAT	2500
3191	UAUCCAU CUGAUGAG X CGAA ICCAUUGU	1777	ACAATGGC C ATGGAATA	2501
3192	UUAUCCA CUGAUGAG X CGAA IGCCAUG	1778	CAATGGCC A TGGAATAA	2502
3203	GUAAAAU CUGAUGAG X CGAA UUUUUU	1779	GAATAAAC C ATTTTAC	2503
3204	UGUAAAA CUGAUGAG X CGAA IGUUUUU	1780	AATAAAC A TTTTAC	2504

Table 5

Table 5: Human PTP-1B G-Cleaver Ribozyme and Target Sequence

Nt. position	Ribozyme Sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
25	CACUG UGAUG GCAUGACAUAGC GCG GCGUCUAGCC	2505	GGCAGAGCGC G CAGTG	2670
35	CUUCU UGAUG GCAUGACAUAGC GCG GCGCCAGUCG	2506	GCGTGGGCG G AGAG	2671
46	UCUCU UGAUG GCAUGACAUAGC GCG GCGUCUAGCU	2507	AGAGGAGCG C CAGCA	2672
55	CAGCG UGAUG GCAUGACAUAGC GCG GCGUCUAGCG	2508	CCGACGAGCC G CCGTG	2673
89	CUGCU UGAUG GCAUGACAUAGC GCG GCAUCUCUU	2509	GAAGGAGTTC G AGCG	2674
98	CUUCU UGAUG GCAUGACAUAGC GCG GCAUCUCUG	2510	CGGCGAGTC G ACAAG	2675
138	CAUGU UGAUG GCAUGACAUAGC GCG GGAUAUCCUG	2511	CAGGATATCC G ACATG	2676
143	GGCUU UGAUG GCAUGACAUAGC GCG AUBUGGUA	2512	TATCGAAT G AAGCC	2677
152	GAAGU UGAUG GCAUGACAUAGC GCG ACUGGCUCA	2513	TGAAGCNGT G ACTTC	2678
195	UAUUU UGAUG GCAUGACAUAGC GCG GGUUUUUGU	2514	AACAAAAAC G AAATA	2679
224	AUGGU UGAUG GCAUGACAUAGC GCG AAAGGAGU	2515	CAGTCCCTTT G ACCAT	2680
260	AUGU UGAUG GCAUGACAUAGC GCG AUAUUCUU	2516	AGAAAGTAT G ACTAT	2681
272	ACUAG UGAUG GCAUGACAUAGC GCG GUGUAUAG	2517	CTATATCAAC G CTAGT	2682
280	UUUAU UGAUG GCAUGACAUAGC GCG AAACUAGCU	2518	AGCGTAGTTT G ATAAA	2683
331	UUAGG UGAUG GCAUGACAUAGC GCG AAAGGCGCU	2519	AGGCGCCTTT G CCTAA	2684
342	GACCG UGAUG GCAUGACAUAGC GCG AUGUUGAGG	2520	CCTAACACAT G CGGTC	2685
394	UUGAG UGAUG GCAUGACAUAGC GCG AUGACGAC	2521	GGTGCGTAT G CTCAA	2686
406	UCCAU UGAUG GCAUGACAUAGC GCG ACUCUUGA	2522	TCAACGAGT G ATGGA	2687
429	GUCCG UGAUG GCAUGACAUAGC GCG AUUUUAAGA	2523	TGGTAAAT G CGCAC	2688
431	UUGUG UGAUG GCAUGACAUAGC GCG GCAUUUAAC	2524	GTAAATGG G CACAA	2689
466	AAGAU UGAUG GCAUGACAUAGC GCG AUUCUUUUU	2525	AAAGAGAT G AYCTT	2690
473	GUUUU UGAUG GCAUGACAUAGC GCG AAAGAUCAG	2526	GATGATCTTT G AGAGC	2691
487	AAUUU UGAUG GCAUGACAUAGC GCG AAUUUGUG	2527	ACACAATTT G AAATT	2692
499	GGGAU UGAUG GCAUGACAUAGC GCG AAUUUAUU	2528	AATTACAGT G AYCTC	2693
506	AUUUU UGAUG GCAUGACAUAGC GCG AGAUAUAAU	2529	ATTGATCTCT G AAGAT	2694
532	UUGUG UGAUG GCAUGACAUAGC GCG ACUGUAUUA	2530	ATTATACAGT G CGACA	2695
534	GCUGU UGAUG GCAUGACAUAGC GCG GCACUUAUA	2531	TATACAGTGC G ACAGC	2696
573	UCUCU UGAUG GCAUGACAUAGC GCG GAGUUUCUG	2532	CAGAAACTC G AGAGA	2697

Table 5

608	AAAGU UGAUG GGAUGGACUAUGC GGG AGGCGAUGUG	2533	CACATGGCCT G AACTTT	2698
623	UGAUU UGAUG GGAUGGACUAUGC GGG AGGCGAUGUG	2534	TGGATGCTT G AACTTT	2699
643	AAAUU UGAUG GGAUGGACUAUGC GGG AAGAAUGAGG	2535	CCATCATTTT G AACTTT	2700
663	ACUUC UGAUG GGAUGGACUAUGC GGG GGACUUGAAG	2536	TTCAAAGTCC G AGAGT	2701
706	CAGUG UGAUG GGAUGGACUAUGC GGG ACCACAAAGG	2537	CGTTGTGGT G CACTG	2702
711	CAGUG UGAUG GGAUGGACUAUGC GGG AGGAGCACAC	2538	GTGGTGCACT G CAGTG	2703
716	GCUGU UGAUG GGAUGGACUAUGC GGG ACUGGACUAG	2539	GCACCTGCAGT G CAGGC	2704
752	GGUAU UGAUG GGAUGGACUAUGC GGG AACACAGACG	2540	CTGTCTGGCT G ATACG	2705
759	AGAGG UGAUG GGAUGGACUAUGC GGG AGGUUAUCAG	2541	GCCTGATACCT G CTTCT	2706
766	AUCAG UGAUG GGAUGGACUAUGC GGG AAGAGGAGG	2542	CCCTGCCTTT G CTGAT	2707
769	UCCAU UGAUG GGAUGGACUAUGC GGG AGCAGAGGCG	2543	GCCTCTGGCT G ATGGA	2708
800	GAUAU UGAUG GGAUGGACUAUGC GGG AACGGAAAGAA	2544	TTCTTCGGTT G ATATC	2709
814	AACAG UGAUG GGAUGGACUAUGC GGG ACUUUUUUGA	2545	TCAGAAAGT G CTGTT	2710
826	UUCUU UGAUG GGAUGGACUAUGC GGG AUUUUUAACA	2546	TGTTAGAAAT G AGGAA	2711
847	UGGAU UGAUG GGAUGGACUAUGC GGG AGCCCAUUC	2547	GGATGGGGCT G ATCCA	2712
860	CUGGU UGAUG GGAUGGACUAUGC GGG GGCUGUCUGG	2548	CCAGACAGCC G ACACG	2713
868	AAGCG UGAUG GGAUGGACUAUGC GGG AGCUGUUGGG	2549	CGACACAGCT G CGCTT	2714
889	AGAAU UGAUG GGAUGGACUAUGC GGG GCAAGCUGUIC	2550	GACACAGTGC G CTTCT	2715
893	UCCAU UGAUG GGAUGGACUAUGC GGG ACAGCCAGGU	2551	ACCTGGCTGT G ATCGA	2716
899	ACCUU UGAUG GGAUGGACUAUGC GGG GAUCAGAGCC	2552	GGCTGTGATC G AAGGT	2717
899	UUGGG UGAUG GGAUGGACUAUGC GGG ACCUUCGAGC	2553	GATCGAAGGT G CCAGG	2718
928	UCCUG UGAUG GGAUGGACUAUGC GGG ACGGGAAGAGU	2554	ACTCTTCGT G CAGGA	2719
956	GUCCU UGAUG GGAUGGACUAUGC GGG GUUGGGAAGC	2555	GCCTTCCAC G AGGAC	2720
977	AUCGU UGAUG GGAUGGACUAUGC GGG GGGUUGGGGCG	2556	GGCCCAUUC G AGCAT	2721
1011	GGUAU UGAUG GGAUGGACUAUGC GGG GUUUUGGGUUG	2557	CCACCCAAAC G AATCC	2722
1038	CCUUG UGAUG GGAUGGACUAUGC GGG AUUUCCCAU	2558	AATGGAAAT G CAGGG	2723
1069	UCCUU UGAUG GGAUGGACUAUGC GGG ACCACUUGGU	2559	ACAGTGGGT G AAGGA	2724
1098	UGAGG UGAUG GGAUGGACUAUGC GGG ABUCUUUAUC	2560	GATAAGACT G CCGCA	2725
1133	UGCGG UGAUG GGAUGGACUAUGC GGG AUUUUAGGGG	2561	CCCTTAAAT G CGCGA	2726
1136	GGGUG UGAUG GGAUGGACUAUGC GGG GGCAUUUAG	2562	CTTAATGGC G CACCC	2727
1151	GCUUU UGAUG GGAUGGACUAUGC GGG GAUGCCCGUAG	2563	CTACGGATC G AAAGC	2728

Table 5

1159	UGACU UGAUG GCAUGGCAUAUGC GCG AUGGCUUGCA	2564	TCGAAGCANT G AGTCA	2729
1172	ACACU UGAUG GCAUGGCAUAUGC GCG AGAUCUUGCA	2565	TCAGACACT G AGGTT	2730
1206	CACCU UGAUG GCAUGGCAUAUGC GCG GAGGCAUUC	2566	GGAGTCCTC G AGGTG	2731
1211	CUUGG UGAUG GCAUGGCAUAUGC GCG ACCUCGAGA	2567	TCCTCGAGT G CCAG	2732
1220	GGAGG UGAUG GCAUGGCAUAUGC GCG AGCCUGGCA	2568	TGCCAGGCT G CCTCC	2733
1249	UCGGG UGAUG GCAUGGCAUAUGC GCG AGUGAGGCU	2569	AGCCGCTACT G CCGT	2734
1253	CUUCU UGAUG GCAUGGCAUAUGC GCG GGGCAGUAC	2570	GTCACTGCC G AGAG	2735
1262	GUCCU UGAUG GCAUGGCAUAUGC GCG GUCCUUCUG	2571	CGAGAGAGC G AGGAC	2736
1271	CAGUG UGAUG GCAUGGCAUAUGC GCG AUGGUCUUG	2572	CGAGGACAT G CACTG	2737
1276	UACCU UGAUG GCAUGGCAUAUGC GCG AGUGCAUGU	2573	ACCATGCACT G AGTTA	2738
1308	CCACG UGAUG GCAUGGCAUAUGC GCG ACAUGUUGAC	2574	GTCAACATGT G CGTGG	2739
1334	GUAGG UGAUG GCAUGGCAUAUGC GCG GCCCGCCUG	2575	CACGGCCGCG G CTTAC	2740
1344	UUAUG UGAUG GCAUGGCAUAUGC GCG AGAGGUAAG	2576	GTTCACCTCT G CTACA	2741
1379	AGGCU UGAUG GCAUGGCAUAUGC GCG AGGCUAUGU	2577	CACATAGCT G ACCCT	2742
1412	AGAGG UGAUG GCAUGGCAUAUGC GCG GGACAGUGG	2578	CCCACTGTCC G CCTCT	2743
1418	CGGGG UGAUG GCAUGGCAUAUGC GCG AGAGCGGAC	2579	GTCCGCTCT G CCAG	2744
1422	CUUGG UGAUG GCAUGGCAUAUGC GCG GGGCAGAGC	2580	GCTCTGGCC G CAGAG	2745
1433	UCGGG UGAUG GCAUGGCAUAUGC GCG GUGGCCUUG	2581	CAGAGCCAC G CCGGA	2746
1437	CUAGU UGAUG GCAUGGCAUAUGC GCG GGGCGUGGC	2582	GGCCAGGCC G ACTAG	2747
1450	CGGGG UGAUG GCAUGGCAUAUGC GCG AUGCCUUGCA	2583	TAGCAGGCT G CGCG	2748
1453	UACCG UGAUG GCAUGGCAUAUGC GCG GGCAUGCCU	2584	CAGGCATCC G CGGTA	2749
1469	UCGGG UGAUG GCAUGGCAUAUGC GCG GGCCCUUAC	2585	GGTAAGGCC G CCAGA	2750
1477	CUACG UGAUG GCAUGGCAUAUGC GCG GGTCCGGCG	2586	CGCCGAGAC G CGTAG	2751
1513	UAGUG UGAUG GCAUGGCAUAUGC GCG AGAACCAAG	2587	CGTGTGCTC G CACTA	2752
1569	AGGGG UGAUG GCAUGGCAUAUGC GCG AAAAGUAAA	2588	TTTACTTTT G CCGCT	2753
1583	GUACU UGAUG GCAUGGCAUAUGC GCG AAAUGGAGG	2589	CTTCGACTT G AGTAC	2754
1610	CUCCU UGAUG GCAUGGCAUAUGC GCG AAAAAGGCC	2590	GGCATTTT G AGAGA	2755
1619	UCUUU UGAUG GCAUGGCAUAUGC GCG ACUUCUCCA	2591	TGAGGAGAGT G AAAGA	2756
1634	GGCAG UGAUG GCAUGGCAUAUGC GCG AUGGUAUCU	2592	AGATTAACAT G CTGGC	2757
1643	CUUGG UGAUG GCAUGGCAUAUGC GCG GCCGCCAGA	2593	TGCTGGCGG G CAGAG	2758
1678	UGGGG UGAUG GCAUGGCAUAUGC GCG GAGGCCAAG	2594	CTTGGGGCTC G CCGCA	2759

Table 5

1723	UCUGU	UGAUG	GCAUGCAUAUGC	GCG	GUGCGCGCG	2595	CGGCGCGAC	G	CGAGA	2760
1742	AGAUU	UGAUG	GCAUGCAUAUGC	GCG	AAGGGGGGG	2596	CCCCCCCCCT	G	AACTC	2761
1748	CCUGU	UGAUG	GCAUGCAUAUGC	GCG	AGAUUACAG	2597	CCTTAACT	G	CAGGG	2762
1811	UGAUU	UGAUG	GCAUGCAUAUGC	GCG	ACUAUGAUG	2598	CATCAATAG	G	CACCA	2763
1827	UGUUU	UGAUG	GCAUGCAUAUGC	GCG	AAGAAAUUC	2599	GCATTTCTT	G	AACCA	2764
1853	GACAU	UGAUG	GCAUGCAUAUGC	GCG	AAAAAUUUU	2600	AAATTTTTT	G	ATGTC	2765
1865	UGAUU	UGAUG	GCAUGCAUAUGC	GCG	AAGCGUAC	2601	TUTCAGCTT	G	CCATG	2766
1931	CAUGU	UGAUG	GCAUGCAUAUGC	GCG	AAGCGUCC	2602	GGAAGCTTT	G	CCATG	2767
1942	CGCAG	UGAUG	GCAUGCAUAUGC	GCG	AGGCCAUUG	2603	CGTGGGCT	G	CTGGG	2768
1945	UGAGU	UGAUG	GCAUGCAUAUGC	GCG	AGCAGGCCA	2604	TGGGCTCTCT	G	CGTCA	2769
1997	AUAUU	UGAUG	GCAUGCAUAUGC	GCG	ACUAAAUAC	2605	GTTATTAGT	G	ATATT	2770
2014	CUUCU	UGAUG	GCAUGCAUAUGC	GCG	ACGUUACCA	2606	TGGGTAACT	G	AGAA	2771
2030	UAUAG	UGAUG	GCAUGCAUAUGC	GCG	AUGUUUUUU	2607	ATAGAACAT	G	CTATA	2772
2045	GUGUU	UGAUG	GCAUGCAUAUGC	GCG	AUUUAUUU	2608	AATATATAT	G	AACAC	2773
2073	CACAU	UGAUG	GCAUGCAUAUGC	GCG	AUGUUUUUA	2609	TAGAAACAT	G	ATGUG	2774
2078	AUUCU	UGAUG	GCAUGCAUAUGC	GCG	AGUACAUUU	2610	AACATGATG	G	CTATT	2775
2094	AUAUG	UGAUG	GCAUGCAUAUGC	GCG	GGGCAAAUG	2611	ACTTGTCCC	G	CTATT	2776
2103	GGGAG	UGAUG	GCAUGCAUAUGC	GCG	AGAAUAAUG	2612	CGCTATCT	G	CTCCC	2777
2117	UCUAG	UGAUG	GCAUGCAUAUGC	GCG	AGAUAAACG	2613	CGCTATCT	G	CTAGA	2778
2140	GGGAG	UGAUG	GCAUGCAUAUGC	GCG	AGUUAUAG	2614	CTCAATCACT	G	CTCCC	2779
2152	ACAUU	UGAUG	GCAUGCAUAUGC	GCG	AUUCUAUAC	2615	GTATTAGAT	G	CACTG	2780
2186	UUUAU	UGAUG	GCAUGCAUAUGC	GCG	AGGACCAAG	2616	CTTGTCTCT	G	ATGAA	2781
2189	UUUUU	UGAUG	GCAUGCAUAUGC	GCG	AUCAGACAC	2617	GTGTCTGAT	G	AAAAA	2782
2200	UCUAG	UGAUG	GCAUGCAUAUGC	GCG	ACAUUUUUU	2618	AAATATATG	G	CTTGA	2783
2204	CAUUU	UGAUG	GCAUGCAUAUGC	GCG	AGGCAUAUU	2619	ATATGTGCTT	G	AAATG	2784
2209	UUUUU	UGAUG	GCAUGCAUAUGC	GCG	AUUUUAAGCA	2620	TGCTGAAAT	G	AGAAA	2785
2219	GAGAU	UGAUG	GCAUGCAUAUGC	GCG	AAAGUUUUC	2621	GAGAACTTT	G	ATCTC	2786
2226	GUAGU	UGAUG	GCAUGCAUAUGC	GCG	AGAGAUCAA	2622	TTTGTATCT	G	CTTAC	2787
2238	UGGGG	UGAUG	GCAUGCAUAUGC	GCG	ACAUUAGUA	2623	TTCTAATGT	G	CCCCA	2788
2260	ACNAG	UGAUG	GCAUGCAUAUGC	GCG	AGUUUGACU	2624	AHTCCACT	G	CGTGT	2789
2266	UCNUU	UGAUG	GCAUGCAUAUGC	GCG	ACAGGCGGU	2625	ACCTGCTGT	G	CATGA	2790

Table 5

2270	CAGGU UGAUG GCAUGCAUAUGC GCG AUGCACAUGC	2626	GCCCTGGCAAT G ACCTG	2791
2275	AUGAU UGAUG GCAUGCAUAUGC GCG AGGCUAGCA	2627	TCATGCACT G ATCAT	2792
2308	UUCAG UGAUG GCAUGCAUAUGC GCG AACAGGCUA	2628	TAGCCCTGTT G CTGAA	2793
2311	GACUU UGAUG GCAUGCAUAUGC GCG AGCAACAGC	2629	GCCCTGTGCT G AAGTC	2794
2323	CUAG UGAUG GCAUGCAUAUGC GCG GACAUAGCU	2630	AGTCATGTC G CTGAG	2795
2338	AACU UGAUG GCAUGCAUAUGC GCG ACCCUAUUC	2631	GCAATAGGCT G CAGTT	2796
2362	UUGG UGAUG GCAUGCAUAUGC GCG AARUGGCUA	2632	ATAGGCAATT G CCTAA	2797
2378	AGUU UGAUG GCAUGCAUAUGC GCG AUBCCAGAA	2633	TTCCTGGCAAT G AGCT	2798
2389	GAAGU UGAUG GCAUGCAUAUGC GCG ACUAGAGUU	2634	ACACTCTAGT G ACTTC	2799
2400	GGCU UGAUG GCAUGCAUAUGC GCG ACCAGGAAGU	2635	AGTTCCTGCT G AGGCC	2800
2413	UACAG UGAUG GCAUGCAUAUGC GCG AAGACCTUGC	2636	GCAGGGTCTT G CTGTA	2801
2483	CAGAG UGAUG GCAUGCAUAUGC GCG GUGAGGUGU	2637	CACACTCAC G CTCGT	2802
2494	UAAAU UGAUG GCAUGCAUAUGC GCG AUGCCNGAG	2638	CTCTGGAAT G ATTTC	2803
2520	GGGG UGAUG GCAUGCAUAUGC GCG GCGGGGUGU	2639	GACACCCGCC G CCGCC	2804
2546	AUUG UGAUG GCAUGCAUAUGC GCG GGGGCUAUA	2640	ATCAGCCTCC G CCATT	2805
2559	AGUU UGAUG GCAUGCAUAUGC GCG GACUUGGAU	2641	ATTCCAAGTC G ACATT	2806
2571	CUUCU UGAUG GCAUGCAUAUGC GCG AAGAAGAGU	2642	CACCTCTCTT G AGCAG	2807
2582	CAAAU UGAUG GCAUGCAUAUGC GCG ACGGUCUCU	2643	AGCAGACCGT G ATTTC	2808
2602	UCCAG UGAUG GCAUGCAUAUGC GCG AGGUGCCUCU	2644	AGAGGCACT G CTGGA	2809
2621	UGUUU UGAUG GCAUGCAUAUGC GCG AAGAAGGUG	2645	CACACTCTCT G AAGA	2810
2635	ACGU UGAUG GCAUGCAUAUGC GCG ACCCAGGCU	2646	CAGCTTGCGT G AGGCT	2811
2655	GGGG UGAUG GCAUGCAUAUGC GCG AGGUGCCUA	2647	TAGGCAAGCT G CGGTC	2812
2658	GACGG UGAUG GCAUGCAUAUGC GCG AGCAGGCTUC	2648	GAGCCTGCC G CGTC	2813
2682	CUUG UGAUG GCAUGCAUAUGC GCG AAGGUAACC	2649	GGTCACTCTT G CCGAG	2814
2685	UUCU UGAUG GCAUGCAUAUGC GCG GGCAAGGUA	2650	TCACCTTCCC G AGATA	2815
2694	AGAG UGAUG GCAUGCAUAUGC GCG GCTCTCTCG	2651	CCAGAGAGG G CGTCT	2816
2700	UGGG UGAUG GCAUGCAUAUGC GCG AAGCGGCU	2652	AGCGGGTCT G CCGCA	2817
2727	ACAAU UGAUG GCAUGCAUAUGC GCG AGGCCCAACA	2653	TGTGGGCGCT G ATGGT	2818
2733	GUGAG UGAUG GCAUGCAUAUGC GCG ACCAACGCG	2654	GCTGTATGCT G CTGAC	2819
2739	AGAU UGAUG GCAUGCAUAUGC GCG GUGAGACCA	2655	TGCTGCTGAC G ACTCT	2820
2749	CUUUG UGAUG GCAUGCAUAUGC GCG AGGAAGAGUC	2656	GACTCTCTCT G CAAG	2821

Table 5

2761	GUUUU UGAUG GCAUGCACAUAUC GCG AGUUCUCCUUU	2657	AAAGGGAAC G AAGAC	2822
2793	UUUUU UGAUG GCAUGCACAUAUC GCG AUUUUAAAA	2658	TTTTTAACAT G AAAA	2823
2818	UAGCU UGAUG GCAUGCACAUAUC GCG GGGAGCUACA	2659	UTAGCTCCC G AGCTA	2824
2831	GUUGG UGAUG GCAUGCACAUAUC GCG AAGAGAGUAG	2660	CTACTCTCT G CCAG	2825
2850	AANGG UGAUG GCAUGCACAUAUC GCG AAAAUGUAA	2661	TTACATTTT G CCTT	2826
2902	CACCU UGAUG GCAUGCACAUAUC GCG GAUUUUCCC	2662	GGGACATTC G AGGTG	2827
2915	CUUUG UGAUG GCAUGCACAUAUC GCG AGGGUGACAC	2663	GTGTACCCCT G CAGAG	2828
2928	CACCU UGAUG GCAUGCACAUAUC GCG ACCAUAGGUC	2664	GAGCTATGCT G AGGTG	2829
2950	CUUGG UGAUG GCAUGCACAUAUC GCG ACTUAAGCCU	2665	AGCCTTAGCT G CCAGG	2830
2969	CAGCU UGAUG GCAUGCACAUAUC GCG AGAAUGCUUA	2666	TAGCATTTT G AGCTG	2831
3123	CAGCU UGAUG GCAUGCACAUAUC GCG GCUACTCTUC	2667	GAGAGGTAGC G ACCTG	2832
3128	CAGAG UGAUG GCAUGCACAUAUC GCG AGCUUCUAC	2668	GTACGAACT G CTCTG	2833
3133	CAUAG UGAUG GCAUGCACAUAUC GCG AGAGCAGTUC	2669	GAGCTGCTCT G CTATG	2834

Table 6

Table 6: Human PTP-IB DNAzyme and Target Sequence

Nr. Position	DNAzyme Sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
11	GCTTAGG GCTAGCTACACGA CGCTGCG	2835	GGACGG G CCGAGAGC	3545
18	GTCTGCG GCTAGCTACACGA TCTAGGC	2836	GACUAGA G CGGACAGC	3546
21	GCCTGTG GCTAGCTACACGA CGCTGTG	2837	CUAGGCG G CAGACGGC	3547
25	CTGCGCG GCTAGCTACACGA CTGCGGT	2838	AGCGGAG A CGGGGAG	3548
28	CCACTGG GCTAGCTACACGA CGTCTGC	2839	GGACAGG G CGACAGG	3549
30	GCCACTG GCTAGCTACACGA CGCTCTG	2840	CAGAGGC G CAGUGGC	3550
33	TCGGCCA GCTAGCTACACGA TGGCGGT	2841	ACGGGCA G UGGGCCGA	3551
37	CTTCTGG GCTAGCTACACGA CACTGCG	2842	CGGAGG G CCGAGAG	3552
49	CTGCTGG GCTAGCTACACGA CTCCTCT	2843	AGAGGAG G CGCAGAG	3553
51	GGCTCTG GCTAGCTACACGA GCTCTCT	2844	AAGAGGC G CAGCAGC	3554
54	GGGGCTG GCTAGCTACACGA TGGGCTC	2845	GAGGCGA G CAGCGCC	3555
57	CAGGGGG GCTAGCTACACGA TGTCTGC	2846	GGGAGCA G CCGCCGC	3556
60	GGCCAGG GCTAGCTACACGA GGTGTCT	2847	CAGCAGC G CCGGGCC	3557
66	ATGACGG GCTAGCTACACGA CAGGGGG	2848	CCGCCCG G CCGGCAU	3558
70	CTCATGA GCTAGCTACACGA GAGCCAG	2849	CGGGGCC G UCAUGAG	3559
73	CATCTCA GCTAGCTACACGA GAGGGGC	2850	GGCCGUC A UGGAGAG	3560
79	CTTTTCCA GCTAGCTACACGA CTCATGA	2851	UCAUGAG A UGGAGAG	3561
90	TGCTCGAA GCTAGCTACACGA TCTTTTC	2852	GGAAGGA G UUGGCA	3562
96	TGATCTG GCTAGCTACACGA TCGAACTC	2853	GAGUUGA G CAGAGCA	3563
100	CTTGATGA GCTAGCTACACGA CTGTCTGA	2854	UCGACAG A UCGACAG	3564
104	CGAGTTG GCTAGCTACACGA CGATCTG	2855	GGGAGCA A CAGGCGC	3565
108	CTCCGGA GCTAGCTACACGA TTGTGAT	2856	AUGGCAA G UCCGGAG	3566
116	CCGCCAG GCTAGCTACACGA TCCCGAC	2857	GGCCGGA G CUGGGCG	3567
121	AATGGCG GCTAGCTACACGA CAGCTCC	2858	GGAGGCG G GGGCAU	3568
124	GTAAATG GCTAGCTACACGA CGCCAGC	2859	GGGGGCG G CAAUAC	3569
127	CTGTATA GCTAGCTACACGA GGTGCTC	2860	GGCGGCG A UUUACAG	3570
131	TATCTGG GCTAGCTACACGA TAATGGC	2861	GGCAUJ A CAGGAUA	3571
137	GTGGATA GCTAGCTACACGA CCTSGTAA	2862	UUACGAG A UAUCCAG	3572

Table 6

139	ATGTCGGA	GCTAGCTACACGA	ATCTGCT	2863	ACGAGAU	A UCGAGAU	3573
144	GCTTCATG	GCTAGCTACACGA	CGGATATC	2864	GAUACCG	A UGAGAGC	3574
146	TGGCTTCA	GCTAGCTACACGA	GTGGATA	2865	UAUCCGAC	A UGAGGCA	3575
151	GTACTGG	GCTAGCTACACGA	TTCTATGC	2866	GACAUGA	G CGAGUAC	3576
155	GGAGGTCA	GCTAGCTACACGA	TGGCTTCA	2867	UGAGGCA	G UGAGUCC	3577
158	ATGGAGAG	GCTAGCTACACGA	CAGTGGCT	2868	AGCGAGU	A CUUCCAU	3578
165	ACTCTACA	GCTAGCTACACGA	GGGAGATC	2869	GAUUCUCC	A UGAGAGU	3579
167	CGCTCTCA	GCTAGCTACACGA	ATGGAGAG	2870	CUUCCAU	G UGAGUCC	3580
172	CTTGCCCA	GCTAGCTACACGA	TCTACTTG	2871	CAUGUAG	G UGCGAAG	3581
175	AAGCTTGG	GCTAGCTACACGA	CAGCTCTAC	2872	GUGAGUG	G CCGAGUU	3582
180	TTAGGAG	GCTAGCTACACGA	TTGGCCAC	2873	GUCCGAA	G CUUCCUA	3583
191	GGTTTTTG	GCTAGCTACACGA	TCTTAGGA	2874	UCUUAAG	A CMAAACC	3584
197	TATTTCCG	GCTAGCTACACGA	TTCTGTTT	2875	GAACUAAA	A CCGAUAU	3585
203	TGTACTCA	GCTAGCTACACGA	TTCGGTTT	2876	AAUCCGAA	A UAGGUACA	3586
207	TCTCTGTA	GCTAGCTACACGA	CTATTTCC	2877	CGAAUAG	A UAGAGAGA	3587
209	GGTCTCTG	GCTAGCTACACGA	ACCTATTT	2878	AAUAGGU	A CAGAGACG	3588
215	CAAGGAGA	GCTAGCTACACGA	CTCTGTAC	2879	GUACAGAG	A GUGACUCC	3589
221	GGGACTGA	GCTAGCTACACGA	GTCTCTGT	2880	ACAGAGAC	G UGAGUCC	3590
221	GACTATGG	GCTAGCTACACGA	TGAGGTCT	2881	AGACGUCA	G UCCUUUG	3591
230	GACTATGG	GCTAGCTACACGA	CAAGGAGA	2882	UCCUUUG	A CCAUAGUC	3592
233	TCCGACTA	GCTAGCTACACGA	GCTCAGAG	2883	CUUUGACC	A UAGUCCGA	3593
236	TATTTCCG	GCTAGCTACACGA	TATGTCGA	2884	UGACUUA	G UCGAUAU	3594
241	TAGTTTAA	GCTAGCTACACGA	CCGACTAT	2885	AUAGUCCG	A UUAUAUUA	3595
246	TGATGTAG	GCTAGCTACACGA	TTATTCGG	2886	CGGAUUA	A CUACAUA	3596
249	TCTTGATG	GCTAGCTACACGA	AGTTTAAT	2887	AUUAACU	A CAUGAGA	3597
251	CTTCTTGA	GCTAGCTACACGA	GTAGTTTA	2888	UUAACUUC	A UGAGAGAG	3598
260	AGTCATTA	GCTAGCTACACGA	CTTCTTGA	2889	UCUAGAG	A UUAUAGU	3599
263	TATAGTCA	GCTAGCTACACGA	TATCTTCT	2890	AGAAGUAU	A UGACUUA	3600
266	TGATATAG	GCTAGCTACACGA	CATTATCT	2891	AGAUAUAG	A CUUAUUA	3601
269	CGTTGATA	GCTAGCTACACGA	AGTCATTA	2892	UUAUAGU	A UUAUAGG	3602
271	ACGGTTGA	GCTAGCTACACGA	ATAGTCAU	2893	AUGACUUA	A UGAGGCU	3603

Table 6

275	AACTAGCG	GGCTAGCTACACGA	TGATATAG	2894	CUAUAUA A	CGUAGUU	3604
277	CNACTAG	GGCTAGCTACACGA	GTGTATAT	2895	AUAUAAC	G CUAGUUG	3605
281	TTATUAAA	GGCTAGCTACACGA	TAGCTTGT	2896	CAAGCUA	G UUGUAUA	3606
286	CATITTTTA	GGCTAGCTACACGA	CNAATGAG	2897	CUAGUUG	A UAAAUUAG	3607
292	TTCCTTCA	GGCTAGCTACACGA	TTTTATCA	2898	UGUAUAA	A UGGAGAA	3608
301	CGTTTGGG	GGCTAGCTACACGA	TTCTTCCA	2899	UGAGAA	G CCGAAGG	3609
311	GAATGTAA	GGCTAGCTACACGA	TCCTTTGG	2900	CGAAGA	G UUAUAUC	3610
314	TAAATATG	GGCTAGCTACACGA	AACTCTTT	2901	AAGAGU	A CAUUAUA	3611
316	GTATAGAA	GGCTAGCTACACGA	GTAACTCC	2902	GGAGUAC	A UUCUACC	3612
322	GGCCTGGG	GGCTAGCTACACGA	AAGAATGT	2903	ACAUUU	A CCGAGGG	3613
329	GCANAGG	GGCTAGCTACACGA	CCTGGGTA	2904	UACCCAG	G CCGUUGC	3614
336	GTGTTAGG	GGCTAGCTACACGA	AAAGGGCC	2905	GGCCUUU	G CCUACAC	3615
341	CGCATGTG	GGCTAGCTACACGA	TAGGCAAA	2906	UUUGGCU	A CCAUUGC	3616
343	ACCCATGT	GGCTAGCTACACGA	GTTAGGCA	2907	UGCUUAC	A CAUGGCU	3617
345	TGACCGCA	GGCTAGCTACACGA	GTGTTAGG	2908	CUUAAC	A UCGGCUA	3618
347	AATGACCG	GGCTAGCTACACGA	ATGTGTTA	2909	UACACU	G CCGUACU	3619
350	AAAGATGT	GGCTAGCTACACGA	CGATGTGT	2910	CACAUGG	G UCAUUUU	3620
353	CCAAAGAG	GGCTAGCTACACGA	GACCGCAT	2911	AUGCGUC	A CUUUUGG	3621
364	CCACACCA	GGCTAGCTACACGA	CTCCGAAA	2912	UUUGGAG	A UGUUUUGG	3622
367	CTCCACCA	GGCTAGCTACACGA	CATCTCCC	2913	GGAGAGU	G UGUUGGAG	3623
369	TGCTTCCA	GGCTAGCTACACGA	ACCATCTC	2914	GAGUUGU	G UGGAGACA	3624
375	CTTTTCTG	GGCTAGCTACACGA	TCCACAC	2915	GUGUGGA	G CAGAAAG	3625
383	CACCCCTG	GGCTAGCTACACGA	TTTTCTGC	2916	GGAGAAA	G CAGGGUG	3626
389	TGACGACA	GGCTAGCTACACGA	CGCTGCTT	2917	AAGCAGG	G UGUUCCA	3627
391	CATGACGA	GGCTAGCTACACGA	ACCCCTGC	2918	GGAGGHH	G UGUUUNUG	3628
394	GAGCATGA	GGCTAGCTACACGA	GACACCCC	2919	GGGUGUC	G UGUUUCUC	3629
397	GTTCGACA	GGCTAGCTACACGA	GACGACAC	2920	GUGUQUIC	A UGUUUAAC	3630
399	CTGTTGAG	GGCTAGCTACACGA	ATGACGAC	2921	GUGUUCU	G CUACACAG	3631
404	TGACTCTG	GGCTAGCTACACGA	TGACGATG	2922	CAUGUCU	A CAGAGUA	3632
409	CTCCATCA	GGCTAGCTACACGA	TCTGTGTA	2923	UCACAGA	G UGAUGAG	3633
412	TTTCTCCA	GGCTAGCTACACGA	CACCTCTGT	2924	ACAGAGU	A UGGAGAAA	3634

Table 6

422	TTACGAA	GCTAGCTACACGA	CTTCTCC	2925	GGAGAAG	G UUCGUAA	3635
426	CAATTAA	GCTAGCTACACGA	GTACCTTT	2926	AAAGTUC	G UUAANAUG	3636
432	TGTGGCA	GCTAGCTACACGA	TTTAACGA	2927	UGUUUAA	A UGCACAA	3637
434	ATTGTGG	GCTAGCTACACGA	ATTTTAAC	2928	GUUAAAU	G CGCAAAU	3638
436	GTATTGTG	GCTAGCTACACGA	GCATTTTA	2929	UAAAUAG	G CACAAUAC	3639
438	CAGTATTG	GCTAGCTACACGA	GGCGATTT	2930	AAAUAGC	A CAUAUUG	3640
441	GGCCAGTA	GCTAGCTACACGA	TGTGGCGA	2931	UGCGACA	A UACUGGCC	3641
443	GTGGCGAG	GCTAGCTACACGA	ATTGTGGG	2932	CGCAAAU	A CUGGCCAC	3642
447	TTTTGTGG	GCTAGCTACACGA	CAGTATTG	2933	CAUAUAG	G CCAUAAA	3643
450	TCTTTTTG	GCTAGCTACACGA	GGCCAGTA	2934	UACUGCC	A CAAAAGA	3644
469	AAAGATCA	GCTAGCTACACGA	CTCTTTTT	2935	AAAAGAG	A UGAUUGU	3645
472	TTCAAAGA	GCTAGCTACACGA	CATCTCTT	2936	AGAGAUG	A UCUUUGAA	3646
482	AAATTTTG	GCTAGCTACACGA	CTTCRAAG	2937	CUUUGAAG	A CACAAUU	3647
484	CAAAATTTG	GCTAGCTACACGA	GTCTTCAA	2938	UUGAAGAC	A CAAAUUUG	3648
488	ATTTCRAA	GCTAGCTACACGA	TGTGTGCT	2939	AGACAAA	A UUUUBAAU	3649
495	AAATGTTAA	GCTAGCTACACGA	TTCNAATT	2940	AAUUDGAA	A UUAACAUU	3650
499	GATCAATG	GCTAGCTACACGA	TAAATTCG	2941	UGAAAUUA	A CAUUGAUC	3651
501	GAGTCAAA	GCTAGCTACACGA	GTTAAATTT	2942	AAAUUAG	A UUGAUCUC	3652
505	TTCAGAGA	GCTAGCTACACGA	CAATGTGA	2943	UAAACAUUG	A UACUCUGAA	3653
515	ACTTGATA	GCTAGCTACACGA	CTTCAGAG	2944	CUUGAAG	A UACUAGU	3654
517	TGACTTGA	GCTAGCTACACGA	ATCTTCAG	2945	CUBAGAU	A UCAAGUCA	3655
522	TAATATGA	GCTAGCTACACGA	TTCATATC	2946	GAUATCAA	G UCAUAUUA	3656
525	GTATTAATA	GCTAGCTACACGA	GACTTGAT	2947	AUCAAGUC	A UCAUAUAC	3657
527	CTGTATTA	GCTAGCTACACGA	ATGACTTG	2948	CAGUCUAA	A UUAUACAG	3658
530	CGCACTGTA	GCTAGCTACACGA	ATAATGAC	2949	GUCAUAUU	A UACAGUCC	3659
532	TCSGACTGT	GCTAGCTACACGA	ATAATATG	2950	CAUAUAUU	A CAGUCCGA	3660
535	CTGTGCGA	GCTAGCTACACGA	TGTATTAAT	2951	AUAUAUCA	G UGCAGACG	3661
537	AGCTGTGCG	GCTAGCTACACGA	ACTGTATA	2952	UAUAUAUU	A CGACAGCU	3662
540	TCTAGTCTG	GCTAGCTACACGA	CGCACTGT	2953	ACAGUAGU	A CAGCUAGA	3663
543	AATTCATAG	GCTAGCTACACGA	TGTGGGAC	2954	GUSCGACA	G CUAGAUU	3664
549	TTTTTCRA	GCTAGCTACACGA	TCTTAGCTG	2955	CAGCUAGA	A UUGGAAAA	3665

Table 6

557	TTGTAAAG	GCTAGCTACACGA	TTTCCAAT	2956	AUUGAA A CCUACAA	3666
562	TTGGTGG	GCTAGCTACACGA	AGGTTT	2957	AAACUU A CAACCAA	3667
565	TTCTGGG	GCTAGCTACACGA	TGTAGGT	2958	ACCUCA A CCGAGA	3668
574	CTCTGAG	GCTAGCTACACGA	TTCTGGG	2959	CCAGAA A CUGGAG	3669
583	ATGTAGA	GCTAGCTACACGA	CTCTGAG	2960	CUGGAG A UCUACAU	3670
588	TGGAATG	GCTAGCTACACGA	AGCTCTC	2961	GAACUU A CAUUCA	3671
590	ATGGAAA	GCTAGCTACACGA	GTAGATC	2962	GAUCUAC A UUUACAU	3672
596	TGTTATG	GCTAGCTACACGA	ATAGTGA	2963	ACAUUUC A CUUACCA	3673
599	ATGTGTA	GCTAGCTACACGA	AGTGAAT	2964	UUUCCAU A UACACAU	3674
601	CCATGTG	GCTAGCTACACGA	GTATAGT	2965	UCCACU A CAGNUGG	3675
604	AGGCCATG	GCTAGCTACACGA	GTATAGT	2966	ACUUAUC A UGCGCCU	3676
606	TCAGGCCA	GCTAGCTACACGA	GTGTATN	2967	UUAACCA A UGCGCUA	3677
609	AAGTCAG	GCTAGCTACACGA	CATGTGT	2968	ACCAUG G CCGACUU	3678
614	CTCBAAG	GCTAGCTACACGA	CAGGCCAT	2969	AUGGCCU A CUUUGAG	3679
622	TTCAGGA	GCTAGCTACACGA	TCCAAAGT	2970	ACUUGA G UCCUGNA	3680
630	GCTGTGA	GCTAGCTACACGA	TCAGGAC	2971	GUCCUGA A UACCGGC	3681
633	GAGCTGG	GCTAGCTACACGA	GAUUCAG	2972	CCGAAUC A CCAGCTUC	3682
637	GAATGAG	GCTAGCTACACGA	TGTTGAT	2973	AAUACCA G CCUACUC	3683
642	TTCAAGAA	GCTAGCTACACGA	GAGCTGG	2974	CCAGCTUC A UUCUGAA	3684
650	AAAGAAAG	GCTAGCTACACGA	TCAAGAT	2975	AUUCUGA A CUUUCUU	3685
664	CTCTCGGA	GCTAGCTACACGA	TTTGMAA	2976	UUUACAA G UCCGAGAG	3686
672	GAUCCGA	GCTAGCTACACGA	TCTCGAC	2977	GUCCGAG G UCAGGUC	3687
678	CTGATGA	GCTAGCTACACGA	CTGATCT	2978	GAGUCAG G UCACTGAG	3688
681	GGGCTGAG	GCTAGCTACACGA	GACCTGA	2979	UAGGAGU A CUCAGCCC	3689
686	GCTCCGGG	GCTAGCTACACGA	TGATGAT	2980	GUACUUA G CCGGAGC	3690
693	GGCCCTGG	GCTAGCTACACGA	TCCGGCT	2981	AGUCCGA G CCGGCCC	3691
695	CGGGCCCG	GCTAGCTACACGA	GCTCCGGG	2982	CCCGAGC A CGGCGCG	3692
703	ACAAACGG	GCTAGCTACACGA	CGGTGCT	2983	GAGACGG G CCGUUGU	3693
709	CACCAAA	GCTAGCTACACGA	GGGCCGT	2984	ACGGGCC G UGUGGUG	3694
706	GTGACCA	GCTAGCTACACGA	AACGGCC	2985	GGCCGCU G UGUGGAC	3695
709	CGATGCA	GCTAGCTACACGA	CACACGG	2986	CGUUGUG G UGTACUC	3696

Table 6

711	CTGCACTG GGTAGTACTACACGA ACCACAC	2987	GUUUGGU G CACUGCAG	3697
713	CACUGAG GGTAGTACTACACGA GCACACCA	2988	UGUGGUU A CUGACUG	3698
716	CTGCACTG GGTAGTACTACACGA AGTGACCC	2989	GUUGACU C CAGUGCAG	3699
719	TGCTGCA GGTAGTACTACACGA TGCAGTGC	2990	GCACUGCA G UGACAGCA	3700
721	GATGCTG GGTAGTACTACACGA ACTGCACT	2991	ACUUGAU G CAGCAUC	3701
725	TGCGATG GGTAGTACTACACGA CTGCACTG	2992	CAGUGAG G CAUGCGCA	3702
727	CTGTCGA GGTAGTACTACACGA GCCTGCAC	2993	GUCCAGC A UGUGCAGG	3703
731	CAGACCTG GGTAGTACTACACGA GATGTCCT	2994	AGCACUG G CAGGUUUG	3704
735	GTTCGGA GGTAGTACTACACGA CTGCGAT	2995	AUGGAG G UCUUGAAC	3705
742	ACAGAGG GGTAGTACTACACGA TCCAGACC	2996	GGTUGGA A CCGUCUUG	3706
749	CAGCCMA GGTAGTACTACACGA AGAGGTT	2997	AACCUUG G UCUUGCUG	3707
754	GGTATCA GGTAGTACTACACGA CAGACAGA	2998	UCUUGUG G CUGUACC	3708
758	GGCAGTA GGTAGTACTACACGA CAGCCAGA	2999	UCUUGUG A UACUGGCC	3709
760	GAAGCAG GGTAGTACTACACGA ATCAGCCA	3000	UGACUGAU A CUGGCUUC	3710
764	GCAAGGG GGTAGTACTACACGA AGGTATCA	3001	UGUACCU G CCGUUGC	3711
771	TCCATCA GGTAGTACTACACGA CAGACGCA	3002	UGCCUUG G CCGAUGGA	3712
775	CTTGCCA GGTAGTACTACACGA CAGCAGA	3003	UCUUGUG A UGACAGAG	3713
779	TCTCTTG GGTAGTACTACACGA CCACTGCG	3004	GCUGAUG A CAGAGGGA	3714
791	AAGAGGG GGTAGTACTACACGA GTTTCCTC	3005	GAGGAAG A CCGUUCU	3715
802	GATATCA GGTAGTACTACACGA GGAAGAG	3006	CUUCUCC G UGUAUUC	3716
806	TCTGATA GGTAGTACTACACGA CAGCGGAA	3007	UCCCGUG A UAUACAGA	3717
808	TTCCTGA GGTAGTACTACACGA ATCAACGG	3008	CCUUGAU A UCAAGAAA	3718
817	TACACGA GGTAGTACTACACGA TTCTCTGA	3009	UCAAGAA G UCGUGUUA	3719
819	TCTACAG GGTAGTACTACACGA ACTTCTTT	3010	AGAAAGU G CUUUUAGA	3720
822	ATTCTTA GGTAGTACTACACGA AGCACTTT	3011	AAAGUGU C UUGANAAU	3721
829	CTTCTGA GGTAGTACTACACGA TTCTACGA	3012	UGTUGAA A UGAGGAG	3722
837	ATCGAAA GGTAGTACTACACGA TTCTCTAT	3013	AUGAGGA G UUUUGGAU	3723
844	CAGCCCA GGTAGTACTACACGA CCGAAACT	3014	AGUUUGG A UGGGUGG	3724
849	TGGATCA GGTAGTACTACACGA CCATCTCG	3015	CGGAGUG G CUGAUCCA	3725
853	TGCTGGA GGTAGTACTACACGA CAGCCCA	3016	UGGUGUG A UCCAGACA	3726
859	GTGCGCT GGTAGTACTACACGA CTGATACA	3017	UGAUCAG A CAGCGAC	3727

Table 6

862	CTGGCTGG GGTAGTACTACAGG TGTCTGGA	3018	UCCAGAGG A CCGACGAG	3728
866	CGAGCTGG GGTAGTACTACAGG CGGCTGTC	3019	GAGACGG A CCGAGTGC	3729
870	AGCGACAG GGTAGTACTACAGG TGGTGGGC	3020	GCCGACCG G CCGGGGCU	3730
873	GAGGAGGG GGTAGTACTACAGG AGTGGTTC	3021	GACGAGCU G CGCTGCTC	3731
875	AGGAGGAG GGTAGTACTACAGG GCGGCTGG	3022	CAGCGTGC G CTTGCTCC	3732
884	CAGCGGAG GGTAGTACTACAGG AGGAGTAG	3023	CTCTGCTC A CCGGCTGG	3733
889	GATACAG GGTAGTACTACAGG CAGGTAGG	3024	CTGACCTG G CTTGAGTC	3734
892	TTGATGAC GGTAGTACTACAGG AGCCAGGT	3025	ACCTGCTG G TGAUAGAA	3735
895	ACCTTGGA GGTAGTACTACAGG CACAGCCA	3026	UGGCGTGG A UGGAAGGU	3736
902	ATTGTGCA GGTAGTACTACAGG GTTCGATC	3027	GATCGGAG G UGCAAAU	3737
904	GAATTTGG GGTAGTACTACAGG ACCTTGCA	3028	UGGAAGGU G CCAATATC	3738
909	ATGATGAA GGTAGTACTACAGG TTGGCACC	3029	GGGCGCAA A UGCAUACU	3739
913	CCCATGGA GGTAGTACTACAGG GAATTTGG	3030	CCAAUUC A UGGGGGAC	3740
916	GTCCCTGA GGTAGTACTACAGG GATGAATT	3031	AATUATC A UGGGGGAC	3741
923	CGGAGGAG GGTAGTACTACAGG CCCCCTAG	3032	CAUGGGGG A CUCUUCGG	3742
931	ATCTGCGA GGTAGTACTACAGG GGAAGAGT	3033	ACTCTUCC G UGCAAGAU	3743
933	TGATCTGG GGTAGTACTACAGG ACGGAGGA	3034	UCUUCGGU G CAGGAUCA	3744
938	TCCACTGA GGTAGTACTACAGG CCTGCGCG	3035	CGUGGGG A UCAUGGGA	3745
942	TCCTTTCCA GGTAGTACTACAGG TGATCTCG	3036	CAGGAUCA G UGGAAGGA	3746
951	TGGGAAAG GGTAGTACTACAGG TCGTTCCA	3037	UGGAAGGA G CTTUCCGA	3747
959	GTCTCTGG GGTAGTACTACAGG GGGAAAGC	3038	GUUUUCC A CAGGATCC	3748
965	GCTCCAGG GGTAGTACTACAGG CCTCGTGG	3039	CCACGAGG A CCGGAGCG	3749
972	GTTGAGGA GGTAGTACTACAGG TCCAGGTC	3040	GACUAGGA G CCGCGACC	3750
978	TGCTCGGG GGTAGTACTACAGG GGGGGCTC	3041	GAGCCCC A CCGGAGCA	3751
984	GGGATGTA GGTAGTACTACAGG TCGGGTGG	3042	CACCGCG A CAUACCCC	3752
986	GGGGGATA GGTAGTACTACAGG GCTCGGTT	3043	ACCCGAGC A UAUCCCC	3753
988	TGGGAGGA GGTAGTACTACAGG ATGCTTGG	3044	CGAGAGU A UCCGCGCA	3754
996	CGGGGAGG GGTAGTACTACAGG GGGGGGAT	3045	AUCCCCCG A CCGCCCCG	3755
1005	TTGGGTGG GGTAGTACTACAGG GGGGGAGG	3046	CCUCCCCG G CACCCCAA	3756
1008	CGTTTGGG GGTAGTACTACAGG GGCCTGGG	3047	CCCGGGCC A CCGAAGCG	3757
1014	AGGATTGG GGTAGTACTACAGG TTGGGTGG	3048	CACCCCAA A CGAAUCCU	3758

Table 6

1018	CTCCAGG	GGCTAGCTACACGA	TGCTTGG	3049	CCAAACGA	A UCUUGAG	3759
1026	TTGGTGG	GGCTAGCTACACGA	TCCAGGAT	3050	AUCCUGGA	G CCACNAA	3760
1029	CCATTGTG	GGCTAGCTACACGA	GGCTCGAG	3051	CUGGAGCC	A CACAAUG	3761
1031	TCCCATTTG	GGCTAGCTACACGA	GTGGCTCC	3052	GGAGCCAC	A CAAUUGGA	3762
1034	ATTTCGCA	GGCTAGCTACACGA	TGTGTGG	3053	GCCACACA	A UGGGAAU	3763
1041	TCCCTGCA	GGCTAGCTACACGA	TTCCGATT	3054	AAUUGGAA	A UGAGGGA	3764
1043	ACTCCCTG	GGCTAGCTACACGA	ATTTCGCA	3055	UGGGAAAU	G CAGGGAU	3765
1050	GGGAGAA	GGCTAGCTACACGA	TCCCTGCA	3056	UGCAGGGA	G TTUUCGCC	3766
1061	ACTGTGTA	GGCTAGCTACACGA	TTGGGAG	3057	CUUUCGAA	A UGACGAGU	3767
1064	CCCACTGG	GGCTAGCTACACGA	GATTTCGG	3058	CCCAAUAC	A CAGUGGG	3768
1068	TTCAACCA	GGCTAGCTACACGA	TGTGTATT	3059	AAUCACCA	G UGGGUGAA	3769
1072	TTCTCTCA	GGCTAGCTACACGA	CGACTGGT	3060	ACCAUGGG	G UGAGGAA	3770
1084	CTCCTGGG	GGCTAGCTACACGA	CTCTCTCT	3061	AGGAGAG	A CCGAGAG	3771
1094	AGTCTTTA	GGCTAGCTACACGA	CTCTCTGG	3062	CGAGGAG	A UAAAGAGU	3772
1100	TGGGGGAG	GGCTAGCTACACGA	CTTTATCC	3063	GGAAAGAG	A CUGGCCCA	3773
1103	TGATTGGGG	GGCTAGCTACACGA	AGTCTTTA	3064	UAAAGAGU	G CCGCAUCA	3774
1108	TTCTTTGA	GGCTAGCTACACGA	GGGGCAGT	3065	ACUGCCCC	A UGAGGAA	3775
1127	TTTAGGGG	GGCTAGCTACACGA	TTCTTTTT	3066	AAAGGGA	G CCCCUIAA	3776
1136	GGGTGCGG	GGCTAGCTACACGA	TTAAGGGG	3067	CCCCUAA	A UGCGGAC	3777
1138	GGGTGCGG	GGCTAGCTACACGA	ATTTAAGG	3068	CCCTTAAU	G CCGCACCC	3778
1141	GTAGGGTG	GGCTAGCTACACGA	GGCAITTA	3069	UAAAUGCC	G CACCUAC	3779
1143	CGATAGGG	GGCTAGCTACACGA	GGGGCAIT	3070	AAGCGGC	A CCGTACGG	3780
1148	GGATGCGG	GGCTAGCTACACGA	AGGGTGG	3071	CGCACCCU	A CGGCAUUG	3781
1151	TTTGATGG	GGCTAGCTACACGA	CGTAGGTT	3072	ACCUAGG	G CAUCGAAA	3782
1153	GGTTTTCGA	GGCTAGCTACACGA	CGGCTAGG	3073	CUUACGGG	A UGAAAGAG	3783
1160	GGCTCATG	GGCTAGCTACACGA	TTTCGATG	3074	CAUCGAGG	A CAGGAGUC	3784
1162	TTGATCTCA	GGCTAGCTACACGA	GGTTTCGA	3075	UGGAAAGC	A USAGUCAA	3785
1166	TGTTCTGA	GGCTAGCTACACGA	CTATGCTT	3076	AAGCAUGA	A UGAGACA	3786
1172	CTTCAGTG	GGCTAGCTACACGA	CTTGATCT	3077	GAGUCAGC	A CACUGAAG	3787
1174	AACITTCG	GGCTAGCTACACGA	GGTTTGAC	3078	GUCAGAGC	A CUGAAGUU	3788
1180	ACTTCTAA	GGCTAGCTACACGA	TTCACTGT	3079	ACACUGGA	G UUGAGAGU	3789

Table 6

1187	CGACCCGA GGTAGCTACACGA TTCTAACT	3080	AGUAGAA G UCGGUUG	3790
1192	CCCCACGA GGTAGCTACACGA CGGACTTC	3081	GAAGUCGG G UGUUGGG	3791
1195	TCCCCCCA GGTAGCTACACGA GACCCGAC	3082	GUGGGUUC G UGGGAGGA	3792
1205	CTGAGGA GGTAGCTACACGA TTCCCCCC	3083	GGGGGAA G UCUUGAG	3793
1214	CCTGGAGA GGTAGCTACACGA CTGGAAAG	3084	UCUUGAG G UGCCGAG	3794
1216	AGCTTGG GGTAGCTACACGA ACTCGAA	3085	UUGAGU G CCGAGGU	3795
1222	GGAGCAG GGTAGCTACACGA CTGGGAC	3086	GUCCCCG G CUGUUCU	3796
1225	TGGGAGG GGTAGCTACACGA AGCTTGG	3087	CCGACCG G CUUCCCA	3797
1234	CCCTTGG GGTAGCTACACGA TGGGAGG	3088	CUUCCCA G CGAAGGG	3798
1245	AGTBOGG GGTAGCTACACGA TCCCTTT	3089	AAAGGGG G CGUUCU	3799
1248	GGCAATGA GGTAGCTACACGA GGTCCCC	3090	GGGAGCC G UCAUCUC	3800
1251	TCGGGAG GGTAGCTACACGA GACGCTC	3091	GACCGUC A CUGCCGA	3801
1254	TTCTCGGG GGTAGCTACACGA AGTBOGG	3092	CCGUUCU G CCGAGAA	3802
1265	GGTCTGG GGTAGCTACACGA CTTTCTG	3093	CGAAGG A CGGAGCC	3803
1271	GTGATGG GGTAGCTACACGA CTTGTCC	3094	GGAGGAG A CCGGAC	3804
1274	TCAGTGA GGTAGCTACACGA GTTCTGG	3095	CGAGGAC A UGACUG	3805
1276	ACTAGTG GGTAGCTACACGA ATGGTCT	3096	AGAGCAU G CACUAGU	3806
1278	TAACTAG GGTAGCTACACGA GCATGTC	3097	GACCAUG A CUGAGUA	3807
1283	TCCGTAA GGTAGCTACACGA TCAATGA	3098	UGCACGA G UACUGGA	3808
1286	GCTTCAG GGTAGCTACACGA AACTCAGT	3099	ACUAGU A CUGAGAC	3809
1293	AGGAGGG GGTAGCTACACGA TTCCAGTA	3100	UACUGAA G CCGUUCU	3810
1303	CATGTGA GGTAGCTACACGA CAGGAGG	3101	CCUCCUG G UGACUG	3811
1307	GGCAGTG GGTAGCTACACGA TGCAGG	3102	CGGUGA A CAUGUG	3812
1309	CAGGAGA GGTAGCTACACGA GTTACGA	3103	UGGACAC A UGUGUG	3813
1311	GCACGGA GGTAGCTACACGA ATGTTGAC	3104	GUCACAU G UGUGGAC	3814
1313	TAGCAGG GGTAGCTACACGA ACATGTT	3105	CAACAUU G CGUGUA	3815
1315	COTAGCA GGTAGCTACACGA GCATGTT	3106	ACAUGUC G UGKUGG	3816
1318	GACGTAG GGTAGCTACACGA CACGACA	3107	UGUGGUG G CUGGUGU	3817
1321	GAGGACG GGTAGCTACACGA AGCCGCG	3108	GCUGGUG A CGUCCUC	3818
1324	CGTGAAG GGTAGCTACACGA COTAGCA	3109	UGGUGAG G UCCUAGG	3819
1330	GCCGCCCG GGTAGCTACACGA GAGGACG	3110	CGUCCUC A CGGCGGC	3820

Table 6

1333	AGCGCGG GCGTAGCTACACGA COTGAGG	3111	UCCUCAG G CCGGCGU	3821
1337	GCTTAGCG GCGTAGCTACACGA CGCGCGT	3112	CAGGCGG G CCGUACU	3822
1339	GAGTAAAG GCGTAGCTACACGA CCGCGCG	3113	CGCGCGG G CUUACUC	3823
1343	AGACGAGG GCGTAGCTACACGA AAGCGCG	3114	CGCGCGU A CCGCGCU	3824
1349	ACCTGTAG GCGTAGCTACACGA AGAGTAA	3115	UACGCGU G CUACAGU	3825
1352	GGAACTTG GCGTAGCTACACGA AGCAGGG	3116	CCUCUGU A CAGGIUC	3826
1356	AACAGGAA GCGTAGCTACACGA CTGTAGC	3117	UGCUACG G UCCUGUU	3827
1362	CTGTGTGA GCGTAGCTACACGA AGGAACU	3118	AGGUUCU G UUAACAG	3828
1367	TGTTGCTG GCGTAGCTACACGA TGAACGG	3119	CCUBHCA A CAGACAA	3829
1370	ATGTGTTG GCGTAGCTACACGA TGTGTAC	3120	GUUCACA G CACACAU	3830
1373	GCTATGTG GCGTAGCTACACGA TGTGTTG	3121	CAACAGC A CAAUAGC	3831
1375	AGGCTATG GCGTAGCTACACGA GTTGCTGT	3122	ACAGCAC A CAUAGCU	3832
1377	TCAGGCTA GCGTAGCTACACGA TATGTGTT	3123	AGACMAC A UAGCCUA	3833
1380	GGGTCAAG GCGTAGCTACACGA TATGTGTT	3124	AACAACA G CCGUACC	3834
1385	GAGGACGG GCGTAGCTACACGA CAGGTTAT	3125	AUAGCGA A CCGUCUC	3835
1395	AGGTGAGG GCGTAGCTACACGA GGAGGAG	3126	CCUCUCC A CUCACCU	3836
1400	GGTGAGGG GCGTAGCTACACGA GGAGTGA	3127	UCCACUC A CCGCACG	3837
1406	ACAGTGGG GCGTAGCTACACGA GGAGTGG	3128	CGACUCC A CCGACUG	3838
1410	GCGACAGG GCGTAGCTACACGA GGATGGG	3129	CUCACCC A CUGUCGC	3839
1413	GAGGCGGA GCGTAGCTACACGA AGTGGGTG	3130	CACCCACU G UCGGCUU	3840
1417	GGGAGGG GCGTAGCTACACGA GGCACGTG	3131	CACUGUCC G CCGUCGC	3841
1423	TCTGCGGG GCGTAGCTACACGA AGAGGCGG	3132	CGCGCUU G CCGCAGA	3842
1427	GGCTCTTG GCGTAGCTACACGA GGGCAGG	3133	CUZUGCC G CAGAGCC	3843
1432	GGGTGGGG GCGTAGCTACACGA TCTGCGGG	3134	CCGCGAG A CCGCGCC	3844
1436	TCTGGGCG GCGTAGCTACACGA GGGGCTTG	3135	CAGAGCC A CGCCGAC	3845
1438	TAGTGGGG GCGTAGCTACACGA GTGGCTTC	3136	GAGCTCAC G CCGACUA	3846
1443	CTCTGTAG GCGTAGCTACACGA CGGGGGTG	3137	CAGCCCG A CAGACAG	3847
1447	AGGCGCTG GCGTAGCTACACGA TAGTGGGG	3138	CCGACUA G CAGACAG	3848
1451	GCGGATAG GCGTAGCTACACGA CTGTAGT	3139	ACUAGAG G CAGUCGC	3849
1453	CGCGGCGA GCGTAGCTACACGA GCTGTCTA	3140	UAGCAGG A UGCCTCG	3850
1455	TACGCGGG GCGTAGCTACACGA ATGCTGTC	3141	GCGAGCAU G CCGCGGA	3851

Table 6

1458	ACCTACCG	GCTAGCTACACGA	GGCATGCC	3142	GGCATGCC	G CGUAGGU	3852
1461	CTTACCTA	GCTAGCTACACGA	CGCGGAT	3143	AUCGCGG	G UNGUAGU	3853
1465	GGCCGTTA	GCTAGCTACACGA	CTACCGG	3144	CGCGUUG	G UAGGGCC	3854
1471	TCGCGGG	GGTAGCTACACGA	CGTTACCT	3145	AGUUAAG	G CGCGCGA	3855
1474	CGGTCGG	GCTAGCTACACGA	GGCCCTTA	3146	UAGGGCC	G CGGACCG	3856
1479	CTACCGGG	GCTAGCTACACGA	CGGGCGG	3147	GGCGCGG	A CGCGUAG	3857
1482	TCTCTACG	GCTAGCTACACGA	GGTCCGGC	3148	CGCGACC	G CGGACGA	3858
1484	GCTCTCTA	GCTAGCTACACGA	CGGTCGG	3149	CGGACCG	G UAGAGAG	3859
1491	GGGCCGG	GCTAGCTACACGA	TCTCTACG	3150	CGUAGAG	G CGGGGCC	3860
1496	GTCCGGGG	GCTAGCTACACGA	TCGGGCTT	3151	AGGCGCG	G CGCGGAC	3861
1503	AACTTCGG	GCTAGCTACACGA	CGGGGGC	3152	GGCCCGG	A CGGACGU	3862
1507	AACCAACG	GCTAGCTACACGA	CGGTCGG	3153	CGGACCG	A CGUUGGU	3863
1509	AGAACCAA	GCTAGCTACACGA	GTCCGTCC	3154	GGACGGAC	G UGGGUUC	3864
1513	GTCCAGAA	GCTAGCTACACGA	CAAGTCC	3155	GGGCUUG	G UUCGCGC	3865
1518	TTTATGTC	GCTAGCTACACGA	AGAACCAA	3156	UUGGUUC	G CACUAAA	3866
1520	GGTTTTAG	GCTAGCTACACGA	CGGAATCC	3157	GGUUCGC	A CUAAGCC	3867
1526	AGATGGGG	GCTAGCTACACGA	TTTATGTC	3158	GGACUAA	A CCGACUU	3868
1530	GGGGAAAG	GCTAGCTACACGA	GGGTTTTA	3159	UAAAGCC	A UCUUCCC	3869
1541	GACACACA	GCTAGCTACACGA	CGGGGGA	3160	UCCCCCG	A UGUUGUUC	3870
1543	GAGACACA	GCTAGCTACACGA	ATCCGGGG	3161	CGCGGAT	G UGUUGUUC	3871
1545	GTGACACA	GCTAGCTACACGA	ACATCCGG	3162	CGGUUUG	G UGUUGUUC	3872
1547	GGGTGAGA	GCTAGCTACACGA	ACACATCC	3163	GGUUGUG	G UUCACCCC	3873
1552	ATGAGGGG	GCTAGCTACACGA	GAGACACA	3164	UGUGUUC	A CCCCACU	3874
1559	TAAAGAGA	GCTAGCTACACGA	GAGGGGTG	3165	CACCCUUC	A UCUUUUA	3875
1567	GCAAAAGG	GCTAGCTACACGA	AAAGGAT	3166	UACUUUU	G CUUUUUG	3876
1574	GGAAAGGG	GCTAGCTACACGA	AAAGATTA	3167	UACUUUU	G CGCCTCC	3877
1583	ACTCAAGG	GCTAGCTACACGA	GGAGGGGG	3168	CGCCUUC	A CUUUGAG	3878
1590	ATTGGTGA	GCTAGCTACACGA	TCAAGTGG	3169	CUUUUGA	G UACCAAA	3879
1592	GGATTTGG	GCTAGCTACACGA	ACTCAAGG	3170	CUUUUGA	A CCAAAUCC	3880
1597	CTGTGTGA	GCTAGCTACACGA	TGCTTACT	3171	AGUACCA	A UCCACAG	3881
1601	ATGGCTTG	GCTAGCTACACGA	GGATTTGG	3172	CCAAUCC	A CAGGCCAU	3882

Table b

1605	AAATATGG GGTAGTACAAACGA TTGTGGAT	3173	AUCCACAA G CCNUUUU	3883
1608	TCAAARA GGTAGTACAAACGA GGGTGTG	3174	CAACAGCC A UUUUUUGA	3884
1622	CTCTTTCA GGTAGTACAAACGA TCTCTTCA	3175	UGAGAGAA G UGAAAGAG	3885
1632	GCATGGTA GGTAGTACAAACGA TCTCTTTC	3176	GAAGAGA G UACCAUCC	3886
1634	CAGCATGG GGTAGTACAAACGA ACTCTCTT	3177	AAGAGAU A CCNUCUG	3887
1637	CGCCARCA GGTAGTACAAACGA GGTACTCT	3178	AGAGUACC A UGUUGGCG	3888
1639	CGCCGACG GGTAGTACAAACGA ATGGTACT	3179	AGUACCU A CUGGCGGC	3889
1643	CTGGCCCG GGTAGTACAAACGA CAGCATGG	3180	CCAUUCUG G CUGGCGNG	3890
1646	CTCTCTCG GGTAGTACAAACGA CGCCACGA	3181	UGUUGGCG G CGCAGAGG	3891
1648	TCCTCTCG GGTAGTACAAACGA CGCCGACG	3182	CUGGCGGC G CAGAGGGA	3892
1661	GGTGTAGG GGTAGTACAAACGA CCTTCTCC	3183	GGGAAGGG G CCUACACC	3893
1665	GACGGGTG GGTAGTACAAACGA AGGCCCTT	3184	AGGGGCTU A CACCCGUC	3894
1667	AAGNCGGG GGTAGTACAAACGA GTAGGCCC	3185	GGGCTUAC A CCGGUCUU	3895
1671	CTCCACGA GGTAGTACAAACGA GGGTGTAG	3186	CUACACCC G UCUUGGCG	3896
1679	GGGGCGAG GGTAGTACAAACGA CCAAGAC	3187	GUUUUGGG G UUGGCCCC	3897
1683	GGGTGGGG GGTAGTACAAACGA GAGCCCCA	3188	UGGGGCTC G CCCCACCC	3898
1688	GCCTGGGG GGTAGTACAAACGA GGGGCCAG	3189	CUGGCTCC A CCGAGGAC	3899
1695	GGAGGGAG GGTAGTACAAACGA CCTGGGTG	3190	CACCCAGG G CUUCCUCC	3900
1708	CTGGGATG GGTAGTACAAACGA TCCAGGAG	3191	CUCGUGGA G CAUCCACG	3901
1710	GCCTGGGA GGTAGTACAAACGA GCTCCAGG	3192	CCUGGAGC A UCCGAGGC	3902
1717	GGCCGCCG GGTAGTACAAACGA CTGGGATG	3193	CAUCCGAG G CGGGCGGC	3903
1721	GGTGGCTG GGTAGTACAAACGA CCGCTTGG	3194	CCAGCGGG G CGGCAAGC	3904
1724	CTGGGCTG GGTAGTACAAACGA CGCCGCCG	3195	GGCGGGCG G CAGCCAG	3905
1726	GTCTGGCG GGTAGTACAAACGA GCGGCCCG	3196	GGCGCGGC A CGCCAGAC	3906
1728	CTGTCTGG GGTAGTACAAACGA GTGCGGCC	3197	GGCGGACG A CCGAGACG	3907
1733	GGGGGGTG GGTAGTACAAACGA CTGGGTGG	3198	CACGCCAG A CAGGCCCG	3908
1736	GGGGGAGG GGTAGTACAAACGA TGCTGGGC	3199	GGCAGACA G CCCCCCCC	3909
1749	CTCTGAGA GGTAGTACAAACGA TGAAGGGG	3200	CCCCUGGA A UCUUGCAG	3910
1753	GCTCCCTG GGTAGTACAAACGA AGATTGAA	3201	UGGAUUU G CAGGAGGC	3911
1760	GAGAGTGG GGTAGTACAAACGA TCCCTGCA	3202	AGGAGGGA G CACUUCUC	3912
1763	GTGGAGAG GGTAGTACAAACGA TGCTCCCT	3203	AGGAGGGA A CUCUCGAC	3913

Table 6

1770	ATATGGAG	GCTAGCTACACG	GGAGAGTT	3204	AACUUC	A CUCCUAAU	3914
1775	ATATTAATA	GCTAGCTACACG	GGAGAGTT	3205	UCCACUCC	A UAUUUUU	3915
1777	TAATAATA	GCTAGCTACACG	ATGGAGTG	3206	CACUCAAU	A UUUUUUU	3916
1781	TGTTTAA	GCTAGCTACACG	AAATATGG	3207	CUAAUUU	A UUUUUAA	3917
1787	AAAAATGG	GCTAGCTACACG	TTAATATG	3208	UUUUUAA	A CAUUUUU	3918
1790	GGAAAAA	GCTAGCTACACG	TGTTTAA	3209	UUUUUAA	A UUUUUUU	3919
1805	TATGGATG	GCTAGCTACACG	CTTTGGGG	3210	CCCAAGG	G CAUCAAU	3920
1807	ACTATGGA	GCTAGCTACACG	GGCTTTGG	3211	C'AAAGGC	A UCCUAAU	3921
1811	GTGCACTA	GCTAGCTACACG	GGATGGCT	3212	AGGCAUCC	A UAGUCCAC	3922
1814	CTAGTGCA	GCTAGCTACACG	TATGGATG	3213	CAUCCAAU	A GUCACUAG	3923
1816	TGCTATGG	GCTAGCTACACG	ACTATGGA	3214	UCCUAAU	G CACUAGCA	3924
1818	AATGCTAG	GCTAGCTACACG	GGACTATG	3215	CAUAGUCC	A CUAGCAUU	3925
1822	AGAAATGG	GCTAGCTACACG	TAGTGCCAC	3216	GGGCACTA	G CAUUUUUU	3926
1824	CAAGAAA	GCTAGCTACACG	GCTAGTGC	3217	G'CAUAGC	A UUUUUUUG	3927
1834	ATTATGG	GCTAGCTACACG	TCAAGAAA	3218	UUUUUUA	A CONUAAU	3928
1838	ATACATTA	GCTAGCTACACG	TGTTTCAA	3219	UUGAACCA	A UAUUUUU	3929
1841	TTAATACA	GCTAGCTACACG	TATTTGTT	3220	AACCAUAA	A UGUUUUAA	3930
1843	TTTTTAATA	GCTAGCTACACG	ATTATGG	3221	CCAAUAAU	G UAUUUAAA	3931
1845	AATTTTAA	GCTAGCTACACG	ACATTAAT	3222	AUAAUUGU	A UUUUUUU	3932
1851	TCAAAAA	GCTAGCTACACG	TTTTAATG	3223	GUUUUAAA	A UUUUUUUA	3933
1859	GGCTGACA	GCTAGCTACACG	CAAAAAAT	3224	AUUUUUUG	A UGUCCGCC	3934
1861	AAGGCTGA	GCTAGCTACACG	ATCAAAAA	3225	UUUUUGAU	G CCAUGCCU	3935
1865	ATGCAAGG	GCTAGCTACACG	TGACATCA	3226	UUUGUACA	G UCUUGUAA	3936
1870	CCTTGAATG	GCTAGCTACACG	AAGGCTGA	3227	U'GAGCCUU	G CAUCAAAG	3937
1872	GGCTTTGA	GCTAGCTACACG	GCMAAGGT	3228	AGCCUUGC	A U'GAGGCG	3938
1879	TGATTAAG	GCTAGCTACACG	CCTTGAAT	3229	CAUCAAAG	G CUUUUUA	3939
1884	CTTTTGA	GCTAGCTACACG	AAGGCCAT	3230	AGGGCCUU	A UCAAAAAG	3940
1892	TTATTTGA	GCTAGCTACACG	TTTTTGAAT	3231	AUCAAAGA	A UCAAAUUA	3941
1894	TATTTATG	GCTAGCTACACG	ACTTTTGA	3232	CAAAAGU	A CAUUUUUA	3942
1897	ATTATTA	GCTAGCTACACG	TGTACTTT	3233	AAGAUAUA	A UAUUUUU	3943
1900	AGGAATTA	GCTAGCTACACG	TATTTGAT	3234	GUACAAUA	A UAAAUCCU	3944

Table 6

1904	CCTGAGGA GCTAGCTACACGA TTATTTAT	3235	AAUAUAA A UCCUAGG	3945
1912	CAGTACTA GCTAGCTACACGA CTGAGTAT	3236	AUCCUAG G UAGUAGG	3946
1915	TCCCAAGT GCTAGCTACACGA TACCTGAG	3237	CUCAGUA G UACUGGGA	3947
1917	ATTCTCAG GCTAGCTACACGA ACTACTCG	3238	CAGGAGU A CUGGGAU	3948
1924	GCTTTCCA GCTAGCTACACGA TCCCACTA	3239	UACUGGA A UGGAAGGC	3949
1931	TGGCAAGG GCTAGCTACACGA CTTCCTAT	3240	AUGGAAG G CUCUGCCA	3950
1936	GCCATAGG GCTAGCTACACGA AAAGCTTT	3241	AAGGCUU G CCAUGGGC	3951
1939	CAGGCGCA GCTAGCTACACGA GCGAAGC	3242	GCUCUCC A UGAGGUG	3952
1943	GCAGCAGG GCTAGCTACACGA CCATGACA	3243	UGCAUUG G CCUGCUC	3953
1947	TGACGCGG GCTAGCTACACGA AGGCCCAT	3244	AUGGGCCU G CUGGCUCA	3954
1950	GTCTGAGG GCTAGCTACACGA AGCAGGCC	3245	GGCCUCU G CGUCAGAC	3955
1952	TGGTCTGA GCTAGCTACACGA GCAAGCAG	3246	CCUGCUC G UCGACCA	3956
1957	AGTACTGG GCTAGCTACACGA CTGACGCA	3247	UGGUUAG A CCGUACU	3957
1961	TCCCAAGT GCTAGCTACACGA TGGTCTGA	3248	UCAGACCA G UACUGGGA	3958
1963	CTTCCGAG GCTAGCTACACGA ACTGCTTT	3249	AGTCTGAT A CUGGAGAG	3959
1976	TACAACCG GCTAGCTACACGA CTTCTCTC	3250	GAGGAGG A CCGUGUA	3960
1979	GCTTACAA GCTAGCTACACGA GTTCTCTC	3251	GGAGGAG G UUGUAGC	3961
1982	ACTGCTTA GCTAGCTACACGA AACCTCTC	3252	GCACGCU G UAGCGAGU	3962
1986	AACCACTG GCTAGCTACACGA TTACAACC	3253	GGUGUAA G CAGUGUUU	3963
1989	AATACAGA GCTAGCTACACGA TGCTTACA	3254	UGUAAGCA G UUGUUAU	3964
1992	CTAAATAA GCTAGCTACACGA AACTGCTT	3255	AGCGAGU G UUAUUUAG	3965
1995	TCACTAAA GCTAGCTACACGA AACCACTG	3256	CAGUUUUU A UUUUAGUA	3966
2000	CAATATCA GCTAGCTACACGA TAAATAC	3257	GUUAUUU G UGUUAUG	3967
2003	CCCAATTA GCTAGCTACACGA CACTTAAT	3258	AUUUAGU A UUUUGUG	3968
2005	ACCCACAA GCTAGCTACACGA ATCACTAA	3259	UUUUGAGU A UUUUGGUG	3969
2008	GTATACCA GCTAGCTACACGA AATATCAC	3260	GUGUAUU G UGGUAAAC	3970
2012	TCAAGTTA GCTAGCTACACGA CCACATA	3261	UAUUUGG G UAACGUA	3971
2015	TTCTCAGG GCTAGCTACACGA TACCACA	3262	UGGUGUA A CGGAGAAA	3972
2017	TCTTGCTA GCTAGCTACACGA GTTACCCA	3263	UGGUAUAC G UGAGAGAA	3973
2025	TGTGCTTA GCTAGCTACACGA CTCTCGAC	3264	GUGAGAG A UAGAACAA	3974
2030	TAGCATTG GCTAGCTACACGA TCTATCTT	3265	AGAUAAGA A CAAUGCUA	3975

Table 6

2013	TTATAGCA GGTAGCTACACGA TTTTCTAT	3266	AUAGACA A UGUUAAA	3976
2015	TATATAG GGTAGCTACACGA ATTGTCT	3267	AGACAAU G CUUAAUA	3977
2018	ATATATTA GGTAGCTACACGA AGCTTCT	3268	ACAUUGU A UAUUUAU	3978
2041	ATTATATA GGTAGCTACACGA TATAGCAT	3269	AUGCUUA A UUAUUAU	3979
2043	TCATTATA GGTAGCTACACGA ATTATAGC	3270	GUUUAUA A UUAUUAU	3980
2045	GTTCATTA GGTAGCTACACGA ATATATA	3271	UUAUAUA A UUAUGAAC	3981
2048	GGTGTTCA GGTAGCTACACGA TATATATT	3272	AUAUAUA A UAGACACG	3982
2052	CCACGGTG GGTAGCTACACGA TCATTATA	3273	UUAUAUA A CACGUGG	3983
2054	TACCCAGG GGTAGCTACACGA GTTCATTA	3274	UUAUGAAC A CUGUGUA	3984
2056	AATACCCA GGTAGCTACACGA GTGTTCAT	3275	AUGAACAC G UGGGUUU	3985
2060	ATTAAATA GGTAGCTACACGA CCAGTGT	3276	ACACUGG G UUUUUAU	3986
2062	TTATTMAA GGTAGCTACACGA ACCAGGT	3277	ACUGGGU A UUUUAUA	3987
2067	GTTTCTTA GGTAGCTACACGA TAAATACC	3278	GGUUAUA A UAGAAAC	3988
2074	ACAATCAT GGTAGCTACACGA TTCTTATT	3279	AUAAGAA A CAUGAUG	3989
2076	TCACATCA GGTAGCTACACGA GTTTCCTA	3280	UUAAGAAC A UGAUGUA	3990
2079	ATCTCACA GGTAGCTACACGA CATGTTTC	3281	GAACAUG A UUGAGAU	3991
2081	TATCTCA GGTAGCTACACGA ATCATGTT	3282	AACUUGAU G UGAGUUA	3992
2086	CAAGTMA GGTAGCTACACGA CTCATCT	3283	GAUGUAG A UACUUG	3993
2089	GGACAAAG GGTAGCTACACGA AATCTCAT	3284	GUAGAUU A CUUUGUC	3994
2094	AAGCGGA GGTAGCTACACGA AAGTAA	3285	AUAUUUU G UCCCGUU	3995
2099	AGATTAG GGTAGCTACACGA GGGACAAA	3286	UUUUGCC G CUUUAUU	3996
2103	GACGAGAA GGTAGCTACACGA AAGCGGA	3287	UCCCGUU A UUGUGUC	3997
2108	ACAGGAG GGTAGCTACACGA AGATAAG	3288	CUUUAUU G CUUUGU	3998
2115	GGATATTA GGTAGCTACACGA AGGAGCA	3289	UGUUGUU G UUAUUGC	3999
2118	CTACACGA GGTAGCTACACGA AACUGGA	3290	UCCUGUU A UUGUGAG	4000
2122	AGATCTAG GGTAGCTACACGA AGATAACA	3291	UUUUUUU G CUGAGAU	4001
2127	GACTTGA GGTAGCTACACGA CTACAGAA	3292	UCUGUAG A UCAGUUC	4002
2132	ATTAGAAA GGTAGCTACACGA TGAATCTA	3293	UAGUUAU G UUCUUAU	4003
2139	AGCAGTGA GGTAGCTACACGA TGAGTACT	3294	AGUUUCA A UCAUGUU	4004
2142	GGAGACAG GGTAGCTACACGA GATTGAGA	3295	UCUUAUC A CUGUCCG	4005
2145	CGGCGGAG GGTAGCTACACGA AGTATTG	3296	CAUACAU G CUUCCCG	4006

Table 6

2153	AATATACA	GCGTAGCTACAAACA	GCGGGAGC	3297	GUCCCCC G UGUUUAU	4007
2155	TTATATCA	GCGTAGCTACAAACA	ACGGGAGC	3298	UCCCCCGU G UGUUUAG	4008
2157	CTTAAATA	GCGTAGCTACAAACA	ACACGGGG	3299	CCCGUGU G UUAUAGAA	4009
2159	CATTCTAA	GCGTAGCTACAAACA	ACACACCG	3300	CGUUGU A UUAAGUAG	4010
2165	TACTATGA	GCGTAGCTACAAACA	TCTAAATC	3301	GUUATGA A CAUGAUGA	4011
2167	CTTACATG	GCGTAGCTACAAACA	ATTCTTAT	3302	AUUAAGU A CAUGAUGA	4012
2169	ACCTTACA	GCGTAGCTACAAACA	GCATTCTA	3303	UAGAAATC A UUAAGGUG	4013
2171	AGACTCTA	GCGTAGCTACAAACA	ATGCATTC	3304	GAUAGAU G UAAAGGUC	4014
2176	CAAGAAGA	GCGTAGCTACAAACA	CTTACATG	3305	CAURUAG G UCUUUGUG	4015
2184	TCAGGACA	GCGTAGCTACAAACA	AAGAAGAC	3306	GUUUCUU G UGUUUGA	4016
2186	CATCAGCA	GCGTAGCTACAAACA	ACAAAGAG	3307	GUUCUGU G UCCUGAUG	4017
2192	ATTITTCA	GCGTAGCTACAAACA	CNGAGAC	3308	GUUCUGU A UGAUAAU	4018
2199	AGCAGATA	GCGTAGCTACAAACA	TTTTTCAT	3309	GAUAAUA A UAUUGUC	4019
2201	CACACACA	GCGTAGCTACAAACA	ATTITTCA	3310	UAAAAU G UGUUUGA	4020
2203	TTCAACCA	GCGTAGCTACAAACA	ATATTTTT	3311	AAAAAU G UGUUUGA	4021
2205	ATTTCAG	GCGTAGCTACAAACA	ACATATTT	3312	AAUUAUG G UGUUUGA	4022
2212	GTTCCTCA	GCGTAGCTACAAACA	TTCAAGCA	3313	UGUUGUA A UGKAAAC	4023
2219	GATCAAG	GCGTAGCTACAAACA	TTCTCATT	3314	AAUGGAA A CUIUGAUC	4024
2225	ACAGACA	GCGTAGCTACAAACA	CAAAGTTT	3315	AAACUUG A UCUUGUC	4025
2231	TTAGTAA	GCGTAGCTACAAACA	AGAGATCA	3316	UGAUUCU G CUUACAA	4026
2235	CGGCGACA	GCGTAGCTACAAACA	TAGTAAC	3317	CUUGUCU A CUUAGUG	4027
2239	CACTATAG	GCGTAGCTACAAACA	AGCAGAG	3318	GCUIAGUA A UGUUCCOC	4028
2241	ATGGGGCA	GCGTAGCTACAAACA	ATTAGTAA	3319	UUACUAA G UGCCCCAU	4029
2243	ACATGGGG	GCGTAGCTACAAACA	ACNTATGT	3320	ACUAAUG G UGCUAUG	4030
2248	CTTGAGCA	GCGTAGCTACAAACA	GGGCGACA	3321	UUUCCCC A UGUCAAG	4031
2250	GACTTGG	GCGTAGCTACAAACA	ATGGGCGA	3322	UUGCCCC G UCCAGUC	4032
2256	AGGTTTGA	GCGTAGCTACAAACA	TTGGCAT	3323	AUUGCAA G UCCACCU	4033
2261	CAGCGAGG	GCGTAGCTACAAACA	TGGACTTG	3324	GAUUGCA A CUUGCUG	4034
2265	TGCACAGG	GCGTAGCTACAAACA	AGGTTTGA	3325	UCCAAUC G CCGUUGA	4035
2269	GTCAATGA	GCGTAGCTACAAACA	AGGCAAGT	3326	ACCGGCG G UGCAGAC	4036
2271	AGTCTATG	GCGTAGCTACAAACA	ACAGGAG	3327	CUUGCUG G CAUGACU	4037

Table 6

2273	TGAGTCA GCGTAGCTACAAAG	GCAGAGC	3328	GCGTGGC A UGACCTCA	4038
2276	TGTCAGG GCGTAGCTACAAAG	CATGCACA	3329	UGGCAUG A CCGAATCA	4039
2281	TGTAATGA GCGTAGCTACAAAG	CAGTGGT	3330	AGGACCG A UCAATGCA	4040
2284	CAGTGAA GCGTAGCTACAAAG	GATCAGGT	3331	ACCGAUC A UGAGCGG	4041
2287	CAGCCATG GCGTAGCTACAAAG	AATGATCA	3332	UGAUCAU A CAGGCGG	4042
2289	CACAGCA GCGTAGCTACAAAG	GTAATGAT	3333	AUCAUUC A UGCGUUG	4043
2292	AACGAGG GCGTAGCTACAAAG	CATGTGAT	3334	ACAGGCG A CUGGUGU	4044
2295	AGGAACCA GCGTAGCTACAAAG	AGCATGTT	3335	ACAGGCG A UGAGUGU	4045
2298	CTTAGAA GCGTAGCTACAAAG	CACAGCA	3336	UGGCGUG A UGCGUAG	4046
2306	GCACAGG GCGTAGCTACAAAG	TTAGGAAC	3337	GUCCCAA G CCGTGGC	4047
2310	TTGAGCA GCGTAGCTACAAAG	AGGCTTAG	3338	CUAAGCG A UGCGUAA	4048
2313	GACTTCAG GCGTAGCTACAAAG	AACAGGCT	3339	AGCCGUG A CUGAGUC	4049
2319	GACANTGA GCGTAGCTACAAAG	TTGAGCA	3340	UGGCGAA A UGAGUGC	4050
2322	AGCAGCA GCGTAGCTACAAAG	GACTTCAG	3341	CUGAGUC A UGCGUGU	4051
2325	CTGAGCGA GCGTAGCTACAAAG	AATGACTT	3342	AGGCGUG A UGCGUGG	4052
2328	TTGCTGAG GCGTAGCTACAAAG	GACANTGA	3343	UGAGUGC A CUGAGCA	4053
2333	CCCTATTG GCGTAGCTACAAAG	TGAGGAC	3344	GUCCGCA A CUAAGAG	4054
2336	GCACCTTA GCGTAGCTACAAAG	TGCTGAGC	3345	GCUGAGA A UAGGUGC	4055
2341	AACCTGCA GCGTAGCTACAAAG	CCTATTGC	3346	GCAGUGG A UGCGUGU	4056
2343	GAAACTG GCGTAGCTACAAAG	ACCTATT	3347	AAGAGGU A CAGTGGC	4057
2346	CTGAGAAA GCGTAGCTACAAAG	TGCACGCT	3348	AGGUGCA A UGUGCCAG	4058
2357	AATGCCTA GCGTAGCTACAAAG	TGCTGAAA	3349	UUGCAGA A UAGGCGU	4059
2361	GGCAATG GCGTAGCTACAAAG	CTATTGCT	3350	AGGAAUG A CAGTGGC	4060
2363	TAGGQAAA GCGTAGCTACAAAG	GCTATTTC	3351	GAAAGGC A UUGGCCA	4061
2367	GAAATAGG GCGTAGCTACAAAG	AAATGCGT	3352	AGCGAUG A CCGAATC	4062
2372	GCAGGAAA GCGTAGCTACAAAG	TAGGQAAA	3353	UUGGCCA A UUGCGGC	4063
2379	GTGTATG GCGTAGCTACAAAG	CAGGAATT	3354	AAUUGCG A CAGAGAC	4064
2381	GAGTGCCA GCGTAGCTACAAAG	GCAGGAAA	3355	UUGCGGC A UGAGCAC	4065
2384	CTAGATG GCGTAGCTACAAAG	CATCGGAA	3356	CUGGCGG A CAGCUGG	4066
2386	CACTAGAG GCGTAGCTACAAAG	GTATGCGC	3357	GGCAGAC A CUGAGUG	4067
2392	GGAGGTCA GCGTAGCTACAAAG	TAGGTGTT	3358	ACACUCA A UGAGCGC	4068

Table 6

2395	CCAGGAG GGCCTAGCTACACGA CACTAGAG	3359	CUCUAGG A CUCUCUG	4069
2403	GGGCTCA GGCCTAGCTACACGA CAGGAAGT	3360	ACTUCCUG G UGAGGCC	4070
2408	AGCTTGG GGCCTAGCTACACGA CTACCCAG	3361	CUGGAGG G CCGAGCU	4071
2413	AGACACGG GGCCTAGCTACACGA TGCGCTC	3362	GGGCCCC G CUCUCCU	4072
2417	TACACAGA GGCCTAGCTACACGA AGCTGGG	3363	CCGAGCCU G UCUUGUA	4073
2423	CTGCTGTA GGCCTAGCTACACGA CAGACAG	3364	CUBUCCUG G UACAGAG	4074
2425	CCCTGCTG GGCCTAGCTACACGA ALCAGGAC	3365	GUCUUGA A CAGCAGG	4075
2428	AGACCTTG GGCCTAGCTACACGA TGATCCG	3366	CUCUAGG A CAGGCUU	4076
2433	CACGAGA GGCCTAGCTACACGA CCTGCTGT	3367	ACAGGCG G CUCUCCUG	4077
2438	AGTTACG GGCCTAGCTACACGA ANGACCTT	3368	AGGUCUU G CUGUACU	4078
2441	CTGAGTTA GGCCTAGCTACACGA AGCAGAC	3369	GUCUCCU G UACUCAG	4079
2444	TGCTGTAG GGCCTAGCTACACGA TACAGCAA	3370	UUCUGUA A CUCAGCA	4080
2450	TTGGAAATG GGCCTAGCTACACGA CTGAGTTA	3371	UAACTAG A CAUCCAA	4081
2452	CCTTGGA GGCCTAGCTACACGA GTCTGAGT	3372	ACTCAGC A UUCNAG	4082
2461	TTCCGATA GGCCTAGCTACACGA CCTTGAAA	3373	UUCGAGG G UAUUGGA	4083
2463	GCTTCCCA GGCCTAGCTACACGA ACCTTTGG	3374	CCAGGGU G UGGANAG	4084
2470	GAATATGG GGCCTAGCTACACGA TTCCGATA	3375	UAGGGAA G CCAUUAU	4085
2473	TGTGANTA GGCCTAGCTACACGA GCTTTCC	3376	GGGAGCC A UAUUCAG	4086
2475	GGTGTGAA GGCCTAGCTACACGA ATGGCTTC	3377	GAAGCCAU A UUCACCC	4087
2479	GTGAGGTG GGCCTAGCTACACGA GAATATGG	3378	CCAUUAU A CACUCAC	4088
2481	GCCTGAGG GGCCTAGCTACACGA GTGATAT	3379	AUAUUCAC A CUCAGCC	4089
2486	CCAGAGCG GGCCTAGCTACACGA GAGGTGTG	3380	CGACCTUC A CUCUCUG	4090
2488	GTCCAGAG GGCCTAGCTACACGA GTGAGGTG	3381	CACUCAC G CUCUGGAC	4091
2495	AAATCATG GGCCTAGCTACACGA CCAGAGCG	3382	CGCUCUG A CAUGAUU	4092
2497	CTAAATCA GGCCTAGCTACACGA GTCCAGAG	3383	CUCUGGAC A UGUUUUAG	4093
2500	TCCTCTAA GGCCTAGCTACACGA CATGTCCA	3384	UGGACAUU A UUAUAGG	4094
2510	TGTCCTTG GGCCTAGCTACACGA TTCCCTAA	3385	UAGGGA G CAGGAGC	4095
2516	GGGGGGTG GGCCTAGCTACACGA CCTTGCTT	3386	AGGAGGG A CACCCCC	4096
2518	GCGGGGGG GGCCTAGCTACACGA GTCCCTGC	3387	CGAGGAG A CCCCCCGC	4097
2525	GTGGGGGG GGCCTAGCTACACGA GGGGGGTG	3388	CACCCCC G CCCCCAC	4098
2532	CCCAAGGG GGCCTAGCTACACGA GGGGGGGG	3389	GGCCCCC A CCUUGGG	4099

Table 6

2541	GAGGCTGA	GGCTAGCTACACGA	CCCAAGG	3390	CCUUUGG	A	UCAGCCUC	4100
2545	GGCGAGG	GGCTAGCTACACGA	TGAIVCA	3391	UGGAUCA	G	CCUCGCGC	4101
2551	TGGAATGG	GGCTAGCTACACGA	GGAGCTTG	3392	CAGCCUCC	G	CCNUCCA	4102
2554	ACTTGGAA	GGCTAGCTACACGA	GGCGAGG	3393	CCUCCGCC	A	UUCNCAGU	4103
2561	AGTGTGGA	GGCTAGCTACACGA	TTCGGATG	3394	CAUUCGAA	G	UCGACACU	4104
2565	GAGAGTGG	GGCTAGCTACACGA	GACCTTGG	3395	CCAGUUG	A	CACUUCUC	4105
2567	APAGAGAG	GGCTAGCTACACGA	GTCGACTT	3396	AGUGGAC	A	CCUUUCUU	4106
2578	AGGCTCTG	GGCTAGCTACACGA	TCAAGAAG	3397	CUUCUGA	G	CAGACCGU	4107
2582	AATCACGG	GGCTAGCTACACGA	CTGCTCMA	3398	UUAGACAG	A	CCGUGAUI	4108
2585	CCMAATCA	GGCTAGCTACACGA	GGTCTGCT	3399	AGAGACC	G	UGAUUUGG	4109
2588	CTTCCADA	GGCTAGCTACACGA	CACGGTCT	3400	AGACCGUG	A	UUUGGAGG	4110
2601	AGCGGTTG	GGCTAGCTACACGA	CTUCCTTC	3401	GGAGAGG	G	CACGUCUU	4111
2603	CCAGCAGG	GGCTAGCTACACGA	GGCTCTCT	3402	AGGAGGC	A	CCGUGUGG	4112
2607	GTTCACAG	GGCTAGCTACACGA	AGGTGCTT	3403	AGCCACCU	G	CCGGAAC	4113
2614	AGTGTGG	GGCTAGCTACACGA	TTCAGCA	3404	UGUGGAA	A	CACACACU	4114
2617	AAGAGTGG	GGCTAGCTACACGA	GGTTTCCA	3405	UGGAACC	A	CACUUCUU	4115
2619	TCAGAGAG	GGCTAGCTACACGA	GTGGTTTC	3406	GAAGCAC	A	CUUCUGA	4116
2629	CCAGGCTG	GGCTAGCTACACGA	TTCAGAA	3407	UUUUGAA	A	CAGCGUGG	4117
2632	CACCCAGG	GGCTAGCTACACGA	TGTTTCAA	3408	UGGAACA	G	CCUGGUGG	4118
2638	GACCTGCA	GGCTAGCTACACGA	CCAGGCTG	3409	CAGCCUGG	G	UGAGCGUC	4119
2641	AAGGACGG	GGCTAGCTACACGA	CACCCAGG	3410	CCUGGUGG	A	CGUUCUUU	4120
2644	CTAAGAGA	GGCTAGCTACACGA	GGTACGCC	3411	GGGUGAGC	G	UCUUUAG	4121
2653	GCAGGCTG	GGCTAGCTACACGA	CTAAGAGA	3412	UCCUUJAG	G	CAGCGUGC	4122
2656	GGCGCAGG	GGCTAGCTACACGA	TGGCTTAA	3413	UUUAGCA	G	CCUGCGGC	4123
2660	GAGCGCGG	GGCTAGCTACACGA	AGGCTGCC	3414	GGCAGCUU	G	CCGCGUUC	4124
2663	AGAGACGG	GGCTAGCTACACGA	GCGAGGCT	3415	AGCCUCCG	G	CCGUCUUU	4125
2666	GACNGNGA	GGCTAGCTACACGA	GCGCGCAG	3416	CUCGCGCC	G	UUUCUGUC	4126
2672	AACCGGGA	GGCTAGCTACACGA	AGAGACGG	3417	CCGUCUUU	G	UCGUGUUU	4127
2678	AAGGTTGA	GGCTAGCTACACGA	CGGAGACG	3418	CUGUCCCG	G	UUACACUU	4128
2682	CGCGNAGG	GGCTAGCTACACGA	GAACCGGG	3419	CCGCUUUC	A	CCUUGCGG	4129
2687	TUCTTCGG	GGCTAGCTACACGA	AGAGTGAA	3420	UUACACUU	G	CCGAGAGA	4130

Table 6

2697	CAGACGG GACTAGCTACACGA GTCTCTCG	3421	CGAGAG G CGCGUCG	4131
2699	GGCGAGG GGTAGCTACACGA GCTCTCT	3422	AGAGAG G CGUCGCC	4132
2701	GGCGAGA GGTAGCTACACGA GCGCTCT	3423	AGAGGCG G UCUGGCC	4133
2705	GGTGCGG GGTAGCTACACGA AGACGCG	3424	GCGGUCU G CCCCACCC	4134
2710	TTTGAGG GGTAGCTACACGA GGGGAGA	3425	UCUGCCC A CCUCAAA	4135
2718	CACAGGG GGTAGCTACACGA TTGAGGT	3426	ACCUCAA A CCGUGGG	4136
2723	AGGCCCA GGTAGCTACACGA AGGTTTG	3427	CAAAACC G UGGGGCU	4137
2728	CCATCAG GGTAGCTACACGA CCCACAG	3428	CGUGGG G CGGAGUG	4138
2733	GAGCACA GGTAGCTACACGA GAGGCCG	3429	GGGCGUG A UGGUGUC	4139
2736	GSTAGCA GGTAGCTACACGA CATCAGC	3430	GGCUGAG G UGUCGAG	4140
2738	GTGTGAG GGTAGCTACACGA ACCATCAG	3431	CUGAGGU G CUCAGAC	4141
2742	AAGAGTC GGTAGCTACACGA GAGCACA	3432	UGGUGUC A CAGUCUU	4142
2745	AGAGAG GGTAGCTACACGA GSTAGCA	3433	UGUCAG A CUCUCCU	4143
2754	TCCCTTG GGTAGCTACACGA AGGAGAG	3434	CUCUCCU A CUAAGGA	4144
2763	GTCTTCAG GGTAGCTACACGA TCCCTTG	3435	CAAGGGA A CUGAGAC	4145
2770	TGTGAGG GGTAGCTACACGA CTTGATT	3436	AACUGAG A CUCACA	4146
2776	ACTTAAG GGTAGCTACACGA GAGGTCT	3437	AGACUCC A CAUAGU	4147
2778	CCATTAA GGTAGCTACACGA GTGAGGT	3438	ACCUCAC A UUNAGUG	4148
2783	AAAGCCA GGTAGCTACACGA TTAATGT	3439	CACATGA G UGGCUIU	4149
2786	TTTAAAG GGTAGCTACACGA CACTTAAT	3440	AUAAGUG G CTUUTAA	4150
2794	TTTTCAG GGTAGCTACACGA TAAATGC	3441	GCUIIUA A CAUGAAA	4151
2796	GTITTTA GGTAGCTACACGA GTTAAAA	3442	UUUUUAC A UGAAUAC	4152
2803	CTGCGTG GGTAGCTACACGA TTTTCATG	3443	CAUGAAA A CAGGCG	4153
2805	AGTGGCG GGTAGCTACACGA GTTTTCA	3444	UGAAAA A CGGACGU	4154
2808	TACAGCT GGTAGCTACACGA GCGTTT	3445	AAACAGG G CAGUUA	4155
2811	AGCTACG GGTAGCTACACGA TGCGTGT	3446	ACACGCA G CUGUAGU	4156
2814	GGAGCTA GGTAGCTACACGA AGCTGCG	3447	GGCAGU G UAGCUCG	4157
2817	CTGGGAG GGTAGCTACACGA TACAGCTG	3448	CAGCUUA G CCGCCG	4158
2825	GAGATGAG GGTAGCTACACGA TCGGAGC	3449	GCUCGCA G CUCUCUC	4159
2828	CAGAGAG GGTAGCTACACGA AGCTCGG	3450	CCGAGU A CUCUUG	4160
2836	AATGCTGG GGTAGCTACACGA AAGAGAT	3451	ACUCUUG G CAGCANU	4161

Table 6

2840	TGAAATG GCTAGCTACAAGG	3452	UCUUGCA G CAUUUACA	4162
2842	TGTBAAG GCTAGCTACAAGG	3453	UUCGAGC A UUUCACAA	4163
2848	GCAAAATG GCTAGCTACAAGG	3454	CAUUUUC A CAUUUUC	4164
2850	AGCAAAA GCTAGCTACAAGG	3455	AUUUUCG A UUUUGGU	4165
2855	GAGAAAG GCTAGCTACAAGG	3456	CAUAUUU G CCUUUCU	4166
2864	TTTCAAG GCTAGCTACAAGG	3457	CUUUUCU G UGUUNAA	4167
2867	GCTTCTA GCTAGCTACAAGG	3458	UUUUUGU G UGAAGCC	4168
2873	TGTACTG GCTAGCTACAAGG	3459	UGUUNAA G CAAUACA	4169
2877	TCTCTGA GCTAGCTACAAGG	3460	AGAAGCA G UACAGAA	4170
2879	TTTCTCT GCTAGCTACAAGG	3461	AGCCGUA G CAGAGAA	4171
2887	CCACAGG GCTAGCTACAAGG	3462	ACAGAGG A UUCUUUG	4172
2895	TGTTTCCA GCTAGCTACAAGG	3463	GAUAUUU G UGUUGGA	4173
2901	CTGGAATG GCTAGCTACAAGG	3464	AUUUUUG G UGGAGCA	4174
2903	ACCTGAA GCTAGCTACAAGG	3465	UGUUGGA A CAUUGAG	4175
2910	GAGTGA GCTAGCTACAAGG	3466	GUUGGAC A UUGAGGU	4176
2912	CAGGUA GCTAGCTACAAGG	3467	CAUUGAG G UGACACC	4177
2915	CTGAGG GCTAGCTACAAGG	3468	UUCAGGU G UCAUCCU	4178
2920	TAGCTCT GCTAGCTACAAGG	3469	GAGGUUC A CCUGGCG	4179
2925	CACATAG GCTAGCTACAAGG	3470	GUACCCU G CAGAGUA	4180
2928	CCTACCA GCTAGCTACAAGG	3471	CCUGAGA G CUUUGAG	4181
2931	ACACTCA GCTAGCTACAAGG	3472	GCAGAGU A UGUUGAG	4182
2936	TATUCAG GCTAGCTACAAGG	3473	GAGCUUG G UGAGGUG	4183
2938	CTATCCA GCTAGCTACAAGG	3474	AUUGUAG G UGUUNAA	4184
2942	AACTCTTA GCTAGCTACAAGG	3475	GUUGAGU A UGAUAGG	4185
2947	CACCTAG GCTAGCTACAAGG	3476	AGGUUGG A UAGAGGU	4186
2953	GCTTGGG GCTAGCTACAAGG	3477	UGAUUAG G CUUUGGU	4187
2955	CAGCTGG GCTAGCTACAAGG	3478	AGGCUAG G UGCAGGC	4188
2960	GCTTAGG GCTAGCTACAAGG	3479	GUUAGGU G CCAGGCG	4189
2963	ATGCTTA GCTAGCTACAAGG	3480	GUUGCAG G CUGUAGC	4190
2967	TGAAATG GCTAGCTACAAGG	3481	GCCAGGU G UAGCAUU	4191
		3482	GGCUUAA G CAUUCUA	4192

Table 6

2969	GCTCAGAA	GCTAGCTACACGA	GCTTACAG	3483	CUGUAGC	A	UUCUGAGC	4193
2976	CAGCCGAG	GCTAGCTACACGA	TCGAAATG	3484	CAUUCGA	G	CUGCGUG	4194
2980	ACACNAG	GCTAGCTACACGA	CAGCTCAG	3485	CUGAGCUG	G	CUGUUGU	4195
2984	AAAACAA	GCTAGCTACACGA	AAGCNGC	3486	GCGUCGU	G	UUGUUUU	4196
2987	CTTAAMA	GCTAGCTACACGA	AACNAGC	3487	GCGUUGU	G	UUUUUAG	4197
2995	ATACAGA	GCTAGCTACACGA	TTAAAMC	3488	GUUUUAA	G	UCCUGAU	4198
3000	TACATATA	GCTAGCTACACGA	AGGACTTA	3489	UAGTCCU	G	UAAUGUA	4199
3002	CATACATA	GCTAGCTACACGA	AGGAGCT	3490	AGUCCGU	A	UAGUAGU	4200
3004	TACATACA	GCTAGCTACACGA	ATACAGA	3491	UCCUGAU	A	UGUAUGA	4201
3006	ACTACATA	GCTAGCTACACGA	ATATACAG	3492	CUGAUAU	G	UAGUGAGU	4202
3008	CTACTACN	GCTAGCTACACGA	ACATATAC	3493	GUUAUUGU	A	UGUAGAG	4203
3010	AACCTACT	GCTAGCTACACGA	ATACATAT	3494	AUAUGAU	G	UAGUUGU	4204
3013	CCAAACTA	GCTAGCTACACGA	TACATACA	3495	UGUAUGUA	G	UAGUUUGG	4205
3016	CACCCNAA	GCTAGCTACACGA	TACTACAT	3496	AUGUAGU	G	UUGGGUG	4206
3022	TATACACA	GCTAGCTACACGA	CCAACTA	3497	UAGUUGG	G	UGUGUAU	4207
3024	TATATACA	GCTAGCTACACGA	ACCCAAAC	3498	GUUUUGGU	G	UGUAUUA	4208
3026	TATATATA	GCTAGCTACACGA	ACACCGAA	3499	UUGGGUGU	G	UUAUUAU	4209
3028	ACTATATA	GCTAGCTACACGA	ACACACC	3500	GCGUGUGU	A	UUAUUGU	4210
3030	CTACTATA	GCTAGCTACACGA	ATACACAC	3501	GUGUGUAU	A	UUAUAGU	4211
3032	TGCTACTA	GCTAGCTACACGA	ATATACAC	3502	GUGUAUUA	A	UAGUAGCA	4212
3035	AAATGCTA	GCTAGCTACACGA	TATATATA	3503	UUAUUAU	G	UAGCAUUA	4213
3038	TTUGAATG	GCTAGCTACACGA	TACTATAT	3504	AUAUAGU	G	CAUUUUA	4214
3040	TTTUGAUA	GCTAGCTACACGA	GCTACTAT	3505	AUAGUAGC	A	UTUCCAAA	4215
3048	TAGCTCCA	GCTAGCTACACGA	TTTUGAAT	3506	AUBUCAAA	A	UGACUGUA	4216
3052	CCAGTAGG	GCTAGCTACACGA	CCATTTTG	3507	CAAAUUGG	A	CGUACUGG	4217
3054	AACCCAGTA	GCTAGCTACACGA	GTCCATTT	3508	AAAUUGAC	G	UACUGUUA	4218
3056	TAAACGAG	GCTAGCTACACGA	AGTCCAT	3509	AUGGACUG	A	CUGGUUA	4219
3060	AGGTAAAG	GCTAGCTACACGA	CAGTAGGT	3510	ACGUACUG	G	UUUAMCCU	4220
3065	ATAGGAGG	GCTAGCTACACGA	TAAACGAG	3511	CUGGUUA	A	CCUCCUUA	4221
3072	TCCNAGGA	GCTAGCTACACGA	AGGAGGTT	3512	AACTTCCU	A	UCCUUGGA	4222
3083	GCNAGGCT	GCTAGCTACACGA	TCTCCAG	3513	CUGGAGGA	G	CAGCUGGC	4223

Table 6

3086	AGAGCCAG GGCCTAGCTACAAGCA TGCCTCTCC	3514	GGAGACCA G CUGGCUUC	4224
3090	GTGAGAG GGCCTAGCTACAAGCA CAGCTGCT	3515	AGCAGCUG G CUUCACAC	4225
3097	TACAACGAG GGCCTAGCTACAAGCA GGAGAGCC	3516	GGCUUCUC A CUUGUUA	4226
3102	ATGTGTGA GGCCTAGCTACAAGCA AAGGTGGA	3517	UCCACCTU G UACACAAU	4227
3105	ATATGTGT GGCCTAGCTACAAGCA TACAAGGT	3518	ACCUUUT A CAAUUAU	4228
3107	ACATATGT GGCCTAGCTACAAGCA GTACACAG	3519	CUUGUUA A CAUUAUG	4229
3109	TACATATTA GGCCTAGCTACAAGCA GTGTAAUA	3520	UGTUAAC A UUAUUUA	4230
3112	CTCTAACA GGCCTAGCTACAAGCA AATGTGTA	3521	UACAAUU A UGUUAGG	4231
3114	CTCTCTTA GGCCTAGCTACAAGCA ATATGTGT	3522	CACAUUU G UUNGAGG	4232
3123	GCTGTGCTA GGCCTAGCTACAAGCA CTCCTTAA	3523	UUAGAGAG G UAGCAGC	4233
3126	GCAGCTUG GGCCTAGCTACAAGCA TACCTTTC	3524	GAGAGUA G CGAGCUC	4234
3130	CAGAGCAG GGCCTAGCTACAAGCA TCGTTACC	3525	GGUAGCA G CUGGCUUG	4235
3133	TAGCAGAG GGCCTAGCTACAAGCA AGCTGCGT	3526	AGCGAGCU G CUGUQUA	4236
3138	GGACATAG GGCCTAGCTACAAGCA AGAGCAGC	3527	GCUGUCU G CUAGUCC	4237
3141	TAGAGACA GGCCTAGCTACAAGCA AGCAGAGC	3528	GCUGUCU A UGUUUAU	4238
3143	CTTAAGGA GGCCTAGCTACAAGCA ATAGCAGA	3529	UCUGCUAU G UCUUAGG	4239
3151	AAATATTG GGCCTAGCTACAAGCA TTAAAGAC	3530	GUCCUUA G CCAUUAU	4240
3155	AGTAAATTA GGCCTAGCTACAAGCA TCGTTTAA	3531	UUAAGCCA A UAUUUUCU	4241
3157	TGAGTAA GGCCTAGCTACAAGCA ATTGCGTT	3532	AAGCCAU A UUUACUCA	4242
3161	CTGATGAG GGCCTAGCTACAAGCA AAATATTG	3533	CAAUUUU A CUACACAG	4243
3165	TGACCTGA GGCCTAGCTACAAGCA GAGTAAAT	3534	AUUUACUC A UCGGCUA	4244
3170	AAATATGA GGCCTAGCTACAAGCA CTUATGAT	3535	CUACUAG G UCUUUUUU	4245
3173	AAAAATAA GGCCTAGCTACAAGCA GACCTGAT	3536	AUCAGGUC A UUUUUUUU	4246
3176	GTAAATAA GGCCTAGCTACAAGCA AATGACCT	3537	AGGUCUA A UUUUUUAC	4247
3183	GGCCATTG GGCCTAGCTACAAGCA AAUAAATA	3538	UUUUUUU A CAUUGGCC	4248
3186	CATGGCCA GGCCTAGCTACAAGCA TGTAAAAA	3539	UUUUUUA A UGGCCAUU	4249
3189	TTTCATGA GGCCTAGCTACAAGCA CATTGTAA	3540	UUBCAUG G CCUUGGAA	4250
3192	TTATTTCA GGCCTAGCTACAAGCA GGCATTGT	3541	CAUUGGCC A UGGAUUA	4251
3197	ATGGTTTA GGCCTAGCTACAAGCA TCGATGGC	3542	GCANUGA A UAAACCAU	4252
3201	AAATATGA GGCCTAGCTACAAGCA TTATTTCA	3543	UGGAUUA A CAAUUUUU	4253
3204	TGTANAAA GGCCTAGCTACAAGCA GGTTTATT	3544	AAUAAACC A UUUUUUUA	4254

Table 7

Table 7: Human PTP-1B Hairpin Ribozyme and Target Sequence

Nc. Position	Ribozyme sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
10	GCUCUA AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4255	ACGC GGCC TAGAGC	4331
23	UGCGCC AGAA GCGC ACCAGAGAACA X GUACAUUACUGGUA	4256	CAGC AGAC GAGGCA	4332
36	CAGGCG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4257	CAGC AGCC GCGCTG	4333
59	GGCCAG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4258	CAGC CGCC CTGGCC	4334
98	UGGCGG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4259	GAGC AGAT GUACAA	4335
220	CMAAGG AGAA GAGC ACCAGAGAACA X GUACAUUACUGGUA	4260	CGTC AGTC CTTTGT	4336
239	AGUUBA AGAA GAGU ACCAGAGAACA X GUACAUUACUGGUA	4261	AGTC GBAU TAAACT	4337
612	UCCAAA AGAA GGCC ACCAGAGAACA X GUACAUUACUGGUA	4262	GGCC TGAC TTTGGA	4338
636	GAUAGA AGAA GGUU ACCAGAGAACA X GUACAUUACUGGUA	4263	CACC AGCC TAAATC	4339
685	GCUCGC AGAA GAGU ACCAGAGAACA X GUACAUUACUGGUA	4264	ACTC AGCC CGAGAC	4340
702	CACCAAC AGAA GGCC ACCAGAGAACA X GUACAUUACUGGUA	4265	GGCC GATT GTGGTG	4341
748	CAGCCA AGAA GAGC ACCAGAGAACA X GUACAUUACUGGUA	4266	CTTC TGTC TGCGTG	4342
763	GCAGAA AGAA GGUU ACCAGAGAACA X GUACAUUACUGGUA	4267	TACC TGCC TCTTGC	4343
773	UGGUCC AGAA GGAU ACCAGAGAACA X GUACAUUACUGGUA	4268	TTGC TGAT GUACAA	4344
801	GAUAUC AGAA GAGG ACCAGAGAACA X GUACAUUACUGGUA	4269	CTTC GPTT GATATC	4345
842	AGCCGC AGAA GAAU ACCAGAGAACA X GUACAUUACUGGUA	4270	TTTC GBAU GGGGCT	4346
851	GUCGCG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4271	GGCC TGAT CGAGAC	4347
861	CUGGUC AGAA GGUU ACCAGAGAACA X GUACAUUACUGGUA	4272	AGAC AGCC GACGAG	4348
864	CAGCAG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4273	CAGC CGAC GAGCTG	4349
869	AGGCGC AGAA GGUU ACCAGAGAACA X GUACAUUACUGGUA	4274	GACC AGCT GCGCTT	4350
1102	UGAUGG AGAA GUCU ACCAGAGAACA X GUACAUUACUGGUA	4275	AGAC TGCC CAGTCA	4351
1224	UGGGGA AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4276	AGGC TGCC TCGCCA	4352
1253	UUCUCG AGAA GUGA ACCAGAGAACA X GUACAUUACUGGUA	4277	TCAC TGCC CGAGAA	4353
1323	CGUGAG AGAA GUNG ACCAGAGAACA X GUACAUUACUGGUA	4278	CTAC GATC CTACGG	4354
1332	AGCGCC AGAA GUGA ACCAGAGAACA X GUACAUUACUGGUA	4279	TCAC GGCC GGGGCT	4355
1361	CUGGUG AGAA GGBA ACCAGAGAACA X GUACAUUACUGGUA	4280	TTCC TGTG CAGCAG	4356
1383	AGGAGG AGAA GCGU ACCAGAGAACA X GUACAUUACUGGUA	4281	AGCC TGAC CTTCTT	4357
1412	GAGGCG AGAA GUGG ACCAGAGAACA X GUACAUUACUGGUA	4282	CGAC TGTC CGGCTC	4358

Table 7

1416	GGGAG AGAA GACA ACCAGAGAAACA X GUACAUUACCUUGUA	4283	TGTC GGGC TGTGCC	4359
1422	UCUGCG AGAA GAGG ACCAGAGAAACA X GUACAUUACCUUGUA	4284	CGTC TGCC GCGAGA	4360
1441	CTUGUA AGAA GGGG ACCAGAGAAACA X GUACAUUACCUUGUA	4285	CGCC GAGC TAGGAG	4361
1460	CUUACC AGAA GCGG ACCAGAGAAACA X GUACAUUACCUUGUA	4286	CGCG GGTGA GGTGAG	4362
1473	GGUCC AGAA GCGC ACCAGAGAAACA X GUACAUUACCUUGUA	4287	GGGC GCGC GGAACG	4363
1477	UACGCG AGAA GGGG ACCAGAGAAACA X GUACAUUACCUUGUA	4288	CGCC GAGC CGGATA	4364
1501	ACGUCC AGAA GCGG ACCAGAGAAACA X GUACAUUACCUUGUA	4289	CGCC GAGC GGAAGT	4365
1503	ACCAAC AGAA GUCC ACCAGAGAAACA X GUACAUUACCUUGUA	4290	GGAC GGAC GTTGCT	4366
1539	ACACAC AGAA GGGG ACCAGAGAAACA X GUACAUUACCUUGUA	4291	CGCC GGAT GTGTGT	4367
1670	CGCCAA AGAA GGGG ACCAGAGAAACA X GUACAUUACCUUGUA	4292	CACC GGTG TTGGGG	4368
1735	GGGGGG AGAA GGTU ACCAGAGAAACA X GUACAUUACCUUGUA	4293	AGAC AGCC CCGCCG	4369
1864	AUSGCA AGAA GAGC ACCAGAGAAACA X GUACAUUACCUUGUA	4294	TGTC AGCC TTGCAT	4370
1946	UGACGC AGAA GCGC ACCAGAGAAACA X GUACAUUACCUUGUA	4295	GGCC TGCT GCGTCA	4371
1955	GUACUG AGAA GAGG ACCAGAGAAACA X GUACAUUACCUUGUA	4296	CGTC AGAC CAGTAC	4372
1960	UCCGAG AGAA GAUC ACCAGAGAAACA X GUACAUUACCUUGUA	4297	GACC AGTA CTGGGA	4373
1978	GUUAC AGAA GUCC ACCAGAGAAACA X GUACAUUACCUUGUA	4298	AGCC AGTT GTTAGC	4374
2038	AAUAAU AGAA GGTU ACCAGAGAAACA X GUACAUUACCUUGUA	4299	AGCC AGTT GTTATT	4375
2098	ACAAUA AGAA GGAU ACCAGAGAAACA X GUACAUUACCUUGUA	4300	GTCC GCGT TATTCT	4376
2107	ACAGGG AGAA GAGA ACCAGAGAAACA X GUACAUUACCUUGUA	4301	ATTG TGCT CCTGCT	4377
2144	CGGGGG AGAA GUGA ACCAGAGAAACA X GUACAUUACCUUGUA	4302	TCAC TGCT CCGCCG	4378
2190	UUUUUC AGAA GGAC ACCAGAGAAACA X GUACAUUACCUUGUA	4303	GTCC TGAT GAAAAA	4379
2230	UUUGUA AGAA GAGA ACCAGAGAAACA X GUACAUUACCUUGUA	4304	TCCT TGCT TACTAA	4380
2264	GUAAUG AGAA GGUU ACCAGAGAAACA X GUACAUUACCUUGUA	4305	AACC TGCC TTGTCA	4381
2279	UUUGUA AGAA GGUU ACCAGAGAAACA X GUACAUUACCUUGUA	4306	GACC TGAT CATTAC	4382
2309	UUUGUA AGAA GCAC ACCAGAGAAACA X GUACAUUACCUUGUA	4307	AGCC TGTT GGTAAA	4383
2345	UAGACA AGAA GGGC ACCAGAGAAACA X GUACAUUACCUUGUA	4308	GTGC AGTT TTCCAG	4384
2412	UAGACA AGAA GGTU ACCAGAGAAACA X GUACAUUACCUUGUA	4309	CGCC AGCC TGTCCT	4385
2416	UAGACA AGAA GGTU ACCAGAGAAACA X GUACAUUACCUUGUA	4310	AGCC TGTC CTGGTA	4386
2524	GUUGGG AGAA GGGG ACCAGAGAAACA X GUACAUUACCUUGUA	4311	CGCC GCGC CCGCCG	4387
2544	GGCGGA AGAA GAUC ACCAGAGAAACA X GUACAUUACCUUGUA	4312	GATC AGCC TCCGCC	4388
2580	AUACAG AGAA GCTC ACCAGAGAAACA X GUACAUUACCUUGUA	4313	GAGC AGAC CCGTAT	4389

Table 7

2606	GUUCC AGAA GGUU ACCAGAGAAACA X GUACAUUACCUUGGUA	4314	CACC TGCT GGAAAC	4390
2611	CACCCA AGAA GUUU ACCAGAGAAACA X GUACAUUACCUUGGUA	4315	AAMC AGCC TGGGTG	4391
2613	GUAAAG AGAA GUUA ACCAGAGAAACA X GUACAUUACCUUGGUA	4316	TGAC GGTC CTITAG	4392
2655	GGGGCA AGAA GCGU ACCAGAGAAACA X GUACAUUACCUUGGUA	4317	AGGC AGCC TGCCGC	4393
2659	GACGGC AGAA GCGU ACCAGAGAAACA X GUACAUUACCUUGGUA	4318	AGCC TGCC GCGGTC	4394
2662	AGAGAC AGAA GCAG ACCAGAGAAACA X GUACAUUACCUUGGUA	4319	CTGC CGCC GTCTCT	4395
2665	GACAGA AGAA GCGG ACCAGAGAAACA X GUACAUUACCUUGGUA	4320	CGGC CGTC TCTGTC	4396
2671	AACCGG AGAA GAGA ACCAGAGAAACA X GUACAUUACCUUGGUA	4321	TCCT TGTC CCGGTT	4397
2677	AAGUGG AGAA GGAG ACCAGAGAAACA X GUACAUUACCUUGGUA	4322	TCCC GGTTC CACCTT	4398
2704	GGUUGG AGAA GAGC ACCAGAGAAACA X GUACAUUACCUUGGUA	4323	CGTC TGCC CCACCC	4399
2731	AGCAAC AGAA GCGC ACCAGAGAAACA X GUACAUUACCUUGGUA	4324	GGCC TGAT GGTGCT	4400
2810	AGCUAG AGAA GCGG ACCAGAGAAACA X GUACAUUACCUUGGUA	4325	CGGC AGCT GTAGCT	4401
2813	GGGAGC AGAA GCGU ACCAGAGAAACA X GUACAUUACCUUGGUA	4326	CAGC TGTA GCTCCG	4402
2876	UCUCUG AGAA GCGU ACCAGAGAAACA X GUACAUUACCUUGGUA	4327	AGCC AGTA CAGAGA	4403
2999	UACNUA AGAA GGAC ACCAGAGAAACA X GUACAUUACCUUGGUA	4328	GTCC TGTA TATGTA	4404
3085	AGAGCC AGAA GCGC ACCAGAGAAACA X GUACAUUACCUUGGUA	4329	GAGC AGCT GGCTCT	4405
3132	UAGCAG AGAA GCGC ACCAGAGAAACA X GUACAUUACCUUGGUA	4330	GAGC TGCT CTGGTA	4406

Table 8

Table 8: Anti Human PTP-1B HH, NCH, and G Cleaver Ribozymes

Alias	Ribozyme Sequence	Seq. ID Nos	Substrate Seq.	Seq. ID Nos.
HH				
PTP1B-1399	UGUGGUA CUGAUGAGGCCGUUAGGCCGAA AGUGGAA	4407	UUCGACU A UACCACA	4425
PTP1B-879	GGUAGA CUGAUGAGGCCGUUAGGCCGAA AAGCGCA	4408	UGGCGUU C UCCUACC	4426
PTP1B-1393	UGGAGUG CUGAUGAGGCCGUUAGGCCGAA AGGAGGG	4409	CCCUCU C CACUACA	4427
PTP1B-1398	GGAGUG CUGAUGAGGCCGUUAGGCCGAA AGUGGAG	4410	CUCGACU C CACUCCC	4428
PTP1B-1404	GUGGGUG CUGAUGAGGCCGUUAGGCCGAA AGUUGGA	4411	UCCAGCU C CACCAC	4429
PTP1B-2118	UAGCAGA CUGAUGAGGCCGUUAGGCCGAA AACAGGG	4412	CCCUGUU A UUGGUA	4430
PTP1B-2181	GACACAA CUGAUGAGGCCGUUAGGCCGAA AAGACCU	4413	AGGUUUU C UUGUGUC	4431
PTP1B-2183	AGGACAC CUGAUGAGGCCGUUAGGCCGAA AAGAGAC	4414	GUUUCU U GUUUCU	4432
PTP1B-2238	GGCACAU CUGAUGAGGCCGUUAGGCCGAA AGUAGGC	4415	GCUUACU A AUGUGCC	4433
PTP1B-2252	GGACUUG CUGAUGAGGCCGUUAGGCCGAA ACAUGGG	4416	CCCAUGU C CAGUGCC	4434
NCH				
PTP1B-1395	GGUGAG CUGAUGAGGCCGUUAGGCCGAA IGGGAG	4417	CUCCUCC A CUACAC	4435
PTP1B-1408	GACAGUG CUGAUGAGGCCGUUAGGCCGAA IUGGAGG	4418	CCUCAC C CACUCC	4436
PTP1B-1555	GGAUAG CUGAUGAGGCCGUUAGGCCGAA IGUGAGA	4419	UUCACAC C CUACUCC	4437
PTP1B-1578	AGUGGAA CUGAUGAGGCCGUUAGGCCGAA IGGCAAA	4420	UUUGCCC C UUCACU	4438
PTP1B-2113	GAUAACA CUGAUGAGGCCGUUAGGCCGAA IGAGCAG	4421	CUGCUCC C UGUUAC	4439
G-Cleaver				
PTP1B-1267	GUCCU UGAUGGCAUGCAUAGUGCG GUCCUUUCUG	4422	CGAGAAGAC G AGGAC	4440
PTP1B-2184	GGACA UGAUGGCAUGCAUAGUGCG AAGAGACCU	4423	AGGUUCUUU G UGUCC	4441
PTP1B-2241	GGGCA UGAUGGCAUGCAUAGUGCG AUUAGUAGC	4424	GCUIACUAU G UGUCC	4442

Table 9

Table 9: Human methionine aminopeptidase type 2 (Met AP-2) Hammerhead Ribozyme and Target Sequence

Nt. position	Ribozyme Sequence	Seq ID nos.	Substrate Sequence	Seq ID nos.
9	CCGAGAGA CUGAUGAG X CGAA ACGAGGGA	1	TCCCTCGT C TCTCTGG	413
11	GCCCGAGA CUGAUGAG X CGAA AGACGAGG	2	CCTCGTCT C TCTCGGC	414
13	UUGCCGGA CUGAUGAG X CGAA AGAGACGA	3	TGCTCTCT C TCGGCAAA	415
15	UGUUGCCC CUGAUGAG X CGAA AGAGAGAC	4	GTCTCTCT C GGGCAACA	416
43	GAGGCCGC CUGAUGAG X CGAA ACCUCCUC	5	GAGGAGGT A GCGGCTC	417
51	GGCUCGCC CUGAUGAG X CGAA AGGCCGCU	6	AGCGGCCT C CGGAGCC	418
80	GUCGUCUG CUGAUGAG X CGAA AUCCAGGU	7	ACCTGGAT C CAGACGAC	419
108	CAGCCGUA CUGAUGAG X CGAA AGGCGACU	8	AGCTGCCT C TACGGCTG	420
110	CUCAGCCG CUGAUGAG X CGAA AGAGGCAG	9	CTGCTCT A CGGCTGAG	421
167	UGCUGCAG CUGAUGAG X CGAA AGGCCCUU	10	AAGGGCCT T CTGACGCA	422
168	CUCGUCGA CUGAUGAG X CGAA AAGGCCCU	11	AGGGCCTT C TGACGAGC	423
194	UGAUUCUU CUGAUGAG X CGAA AUCAGGUU	12	AACCTGAT A AAGAATCA	424
201	AGGCUCCU CUGAUGAG X CGAA AUUCUUUA	13	TAAAGAT C AGGAGCCT	425
210	CAUCCACU CUGAUGAG X CGAA AGGCUCCU	14	AGGAGCCT C AGTGGATG	426
223	UGUCUUGC CUGAUGAG X CGAA ACUUCUAC	15	GATGAAGT A GCAAGACA	427
234	AUCUUUCC CUGAUGAG X CGAA ACUGUCUU	16	AAGACAGT T GGAAGAT	428
243	CCAAUGCU CUGAUGAG X CGAA AUUUUUCC	17	GGAAAGAT C AGCATTGG	429
249	UAUUCUCC CUGAUGAG X CGAA AUGCUGAU	18	ATCAGCAT T GGAAGATA	430
257	UCUUUCUU CUGAUGAG X CGAA AUUCUCCA	19	TGGAAGAT A AAGAAGA	431
355	UCUGUUUG CUGAUGAG X CGAA ACUUUUUG	20	CCAAAAGT T CAAACAGA	432
356	GUCUGUUU CUGAUGAG X CGAA AACUUUUG	21	CAAAAAGT T AAACAGAC	433
368	AACUGAGG CUGAUGAG X CGAA AGGUCUCG	22	CAGACCCCT C CCTCAGTT	434
372	UUGGAACU CUGAUGAG X CGAA AGGAGGGG	23	CCCTCCCT C AGTTCGNA	435
376	CAUAUUGG CUGAUGAG X CGAA ACUGAGGG	24	CCCTCAGT T CCAATATG	436
377	ACAUAUUG CUGAUGAG X CGAA AACUGAGG	25	CCTCAGTT C CCAATATG	437
382	AGGUCACA CUGAUGAG X CGAA AUUGGAAC	26	GTTCGAAT A TGTGACCT	438
393	CAUUAAGA CUGAUGAG X CGAA ACAGGUCA	27	TGACCTGT A TCCTAATG	439
395	ACCAUUGG CUGAUGAG X CGAA AUACAGGU	28	ACCTGTAT C CTAATGGT	440
398	UACACCAU CUGAUGAG X CGAA AGGAUACA	29	TGATATCT A ATGTGTGA	441
406	UUGGGAAG CUGAUGAG X CGAA ACACCAUU	30	AATGGTGT A TTTCCCAA	442
408	CUUUGGGA CUGAUGAG X CGAA AUACACCA	31	TGGTGTAT T TCCCAAAG	443
409	CCUUUGGG CUGAUGAG X CGAA AAUACACC	32	GGTGTATT T CCCAAAGG	444
410	UCCUUUGG CUGAUGAG X CGAA AAUACAC	33	GTGTATTT C CCAAGGA	445
432	UGGUGUGG CUGAUGAG X CGAA AUUCGCAU	34	ATGCGAAT A CCCACCCA	446
464	AGUUCUCC CUGAUGAG X CGAA AGCAGCUG	35	CAGCTGCT T GGAGAACT	447
473	UUCACUUG CUGAUGAG X CGAA AGUUCUCC	36	GGAGAAGT A CAGTGAA	448
495	CCUGAUUC CUGAUGAG X CGAA AUGCUUUC	37	GAAAGCAT T AGATCAGG	449
496	GCCUGAUC CUGAUGAG X CGAA AAUGCUUU	38	AAAGCATT A GATCAGGC	450
500	ACUUGCCU CUGAUGAG X CGAA AUUCUAAU	39	CATTAGAT C AGGCAAGT	451
517	UCAUUGCA CUGAUGAG X CGAA AUUCUUCU	40	GAAGAGAT T TGGAAATG	452
518	AUCAUUCU CUGAUGAG X CGAA AAUCUCUU	41	AAGAGATT T GGAATGAT	453
527	UUCUCGAA CUGAUGAG X CGAA AUCAUUCU	42	GGAAATGAT T TTCAGGAA	454

Table 9

528	CUUCUCGA	CUGAUGAG	X	CGAA	AAUCAUUC	43	GAATGATT	T	TCGAGAA	455
529	GCUCUCG	CUGAUGAG	X	CGAA	AAUCAUUC	44	AATGATT	T	CGAGAA	456
530	AGCUUCUC	CUGAUGAG	X	CGAA	AAAUCAU	45	ATGATT	T	CAGAGCT	457
551	AAUCUGUC	CUGAUGAG	X	CGAA	AUGUCU	46	AAGCAGT	C	GACAGTT	458
559	UAUUUCU	CUGAUGAG	X	CGAA	ACUUGUC	47	CGACAAGT	T	AGAAAATA	459
560	GUUUUUC	CUGAUGAG	X	CGAA	AACUUGC	48	GACAGATT	A	GAATAATC	460
567	UCAUUCG	CUGAUGAG	X	CGAA	AUUUUA	49	TAGAAAAT	A	CGTAATGA	461
571	CAGCUAU	CUGAUGAG	X	CGAA	ACGUUUU	50	AAATACGT	A	ATGAGCTG	462
583	CCAGGCUU	CUGAUGAG	X	CGAA	AUCCAGC	51	AGCTGGAT	C	AAGCCTGG	463
604	CAGAUUC	CUGAUGAG	X	CGAA	AUCAUUG	52	ACAATGAT	A	GAATCTG	464
610	UUUUCACA	CUGAUGAG	X	CGAA	AUUUCUAU	53	ATAGAAAT	C	TGTGAAA	465
621	AGUCUCC	CUGAUGAG	X	CGAA	ACUUUUA	54	TGAAAAGT	T	GGAAGACT	466
632	CUUGCGU	CUGAUGAG	X	CGAA	ACAGUCU	55	AAGACTGT	T	CAGCAAG	467
633	ACUUGCG	CUGAUGAG	X	CGAA	AACAGUC	56	AGACTGTT	C	ACGCAAGT	468
642	CUUUUAU	CUGAUGAG	X	CGAA	ACUUGCG	57	ACGCAAGT	T	ATAAAAG	469
643	UCUUUAU	CUGAUGAG	X	CGAA	AACUUGC	58	CGCAAGTT	A	ATAAAGA	470
646	UUCUCUU	CUGAUGAG	X	CGAA	AUUAACU	59	AAGTTAAT	A	AAAGAGAA	471
660	CUGCAUU	CUGAUGAG	X	CGAA	AUCCAUUC	60	GAATGGAT	T	AAATGCAG	472
661	CCUGCAU	CUGAUGAG	X	CGAA	AUCCAUU	61	AATGGATT	A	AATGCAG	473
678	CAGUAGG	CUGAUGAG	X	CGAA	AUCCAGG	62	CTGCGATT	T	TCCTACTG	474
679	CCAGUAG	CUGAUGAG	X	CGAA	AUCCAGG	63	CTGCGATT	T	CCTACTGG	475
680	UCCAGUAG	CUGAUGAG	X	CGAA	AAUUGCCA	64	TGCGATT	C	CTACTG	476
683	ACAUCAG	CUGAUGAG	X	CGAA	AGGAAUUG	65	CATTTCTC	A	CTGATGTT	477
692	AUUGAGAG	CUGAUGAG	X	CGAA	ACAUCAG	66	CTGATGTT	T	CTCTCAAT	478
693	UAUUGAG	CUGAUGAG	X	CGAA	ACAUCAG	67	TGATGTT	C	CTCAAT	479
695	AUUAUGA	CUGAUGAG	X	CGAA	AGAAUUC	68	GATGTTCT	C	TCAATAT	480
697	CAUUAU	CUGAUGAG	X	CGAA	AGAAUUC	69	TGTTCTCT	C	ATAATG	481
701	AGCAUUA	CUGAUGAG	X	CGAA	AUUGAGAG	70	CTCTCAAT	A	ATTGCT	482
704	GGCAGCAC	CUGAUGAG	X	CGAA	AUUAUGA	71	TCAATAT	T	GTGCTGCC	483
716	GGGAGUA	CUGAUGAG	X	CGAA	AUGGGCAG	72	CTGCCAT	T	ATACTCCC	484
717	UGGAGUA	CUGAUGAG	X	CGAA	AAUGGGCA	73	TGCCCAT	A	TACTCCCA	485
719	AUUGGGAG	CUGAUGAG	X	CGAA	AUAAUGGG	74	CCCATAT	A	CTCCCAAT	486
722	GGCAUUG	CUGAUGAG	X	CGAA	AGUAUUA	75	ATTATACT	C	CAATGCC	487
745	UACUGUA	CUGAUGAG	X	CGAA	ACUGUUG	76	ACAACAGT	A	TTACAGTA	488
747	CAUACUG	CUGAUGAG	X	CGAA	AUACUGU	77	ACAAGTAT	T	ACAGTATG	489
748	UCAUACUG	CUGAUGAG	X	CGAA	AAUACUGU	78	ACAGTAT	A	CAGTATGA	490
753	UGUCAUA	CUGAUGAG	X	CGAA	ACUGUAU	79	ATTACAGT	A	TGATGACA	491
763	AUUUUA	CUGAUGAG	X	CGAA	AUGUCAUC	80	GATGATCAT	C	TGTAAT	492
767	GUCUAUU	CUGAUGAG	X	CGAA	ACAGAUU	81	ACATCTGT	A	AAATAGAC	493
772	CCAAAGUC	CUGAUGAG	X	CGAA	AUUUUA	82	TGTAAAT	A	GACTTTGG	494
777	GUGUCCA	CUGAUGAG	X	CGAA	AGUCUAU	83	AAAGACT	T	TGGAACAC	495
778	UGUGUCC	CUGAUGAG	X	CGAA	AAGUCUAU	84	ATAGACTT	T	GGAACAC	496
788	ACCACUA	CUGAUGAG	X	CGAA	AUGUGUUC	85	GAACACAT	A	TAAGTGGT	497
790	CUACACU	CUGAUGAG	X	CGAA	AUAGUGU	86	ACACATAT	A	AGTGGTAG	498
797	AAUAAUCC	CUGAUGAG	X	CGAA	ACCACUA	87	TAAGTGGT	A	GGATTATT	499
802	CAGUCAA	CUGAUGAG	X	CGAA	AUCCUACC	88	GGTAGGAT	T	ATTGACTG	500
803	ACAGUCA	CUGAUGAG	X	CGAA	AAUCCUAC	89	GTAGGATT	A	TTGACTGT	501

Table 9

805	GCACAGUC	CUGAUGAG	X	CGAA	AUAUCCU	90	AGGATTAT	T	GACTGTGC	502
815	GACAGUAA	CUGAUGAG	X	CGAA	AGCACAGU	91	ACTGTGCT	T	TTACTGTC	503
816	UGACAGUA	CUGAUGAG	X	CGAA	AAGCACAG	92	CTGTGCTT	T	TACTGTCA	504
817	GUGACAGU	CUGAUGAG	X	CGAA	AAAGCAC	93	TGTGCTTT	T	ACTGTGTC	505
818	AGUGACAG	CUGAUGAG	X	CGAA	AAAAGCAC	94	GTCCTTTT	A	CTGTCACT	506
823	UUAAGAGU	CUGAUGAG	X	CGAA	ACAGUAAA	95	TTTACTGT	C	ACTTTTAA	507
827	GGGAUUA	CUGAUGAG	X	CGAA	AGUGACAG	96	CTGTCACT	T	TTAATCCC	508
828	UGGGAUUA	CUGAUGAG	X	CGAA	AAGUGACA	97	TGTCACTT	T	TAATCCCA	509
829	UUGGGAUU	CUGAUGAG	X	CGAA	AAAGUGAC	98	GTCACCTT	T	AATCCCAA	510
830	UUUGGGAU	CUGAUGAG	X	CGAA	AAAAGUGA	99	TCCTCTTT	A	ATCCCAA	511
833	AUAUUUGG	CUGAUGAG	X	CGAA	AUUAAG	100	CTTTTAA	T	CCAAATAT	512
840	ACGUAUCA	CUGAUGAG	X	CGAA	AUUUGGGA	101	TCCCAAAT	A	TGATACGT	513
845	UAUAACG	CUGAUGAG	X	CGAA	AUCAUUA	102	AATATGAT	A	CGTTATTA	514
849	CUUUUAU	CUGAUGAG	X	CGAA	ACGUAUCA	103	TGATAGT	T	ATTAAG	515
850	GCUUUUA	CUGAUGAG	X	CGAA	AACGUAUC	104	GATACGTT	A	TTAAAGC	516
852	CAGCUUU	CUGAUGAG	X	CGAA	AUAACGUA	105	TACGTTAT	T	AAAAGCTG	517
853	ACAGCUUU	CUGAUGAG	X	CGAA	AUAACGU	106	ACGTTATT	A	AAAGCTGT	518
862	GCAUCUU	CUGAUGAG	X	CGAA	ACAGCUUU	107	AAAGCTGT	A	AAAGATGC	519
872	AGUUUAG	CUGAUGAG	X	CGAA	AGCAUCUU	108	AGATAGCT	A	CTAACACT	520
875	UCCAGUGU	CUGAUGAG	X	CGAA	AGUAGCAU	109	ATGCTACT	A	ACACTGGA	521
886	GCACACUU	CUGAUGAG	X	CGAA	AUUCACGU	110	ACTGGAAT	A	AAAGTGTG	522
901	CGAACAU	CUGAUGAG	X	CGAA	AUUCACGC	111	GCTGGAAT	T	GATGTTG	523
907	CACAGACG	CUGAUGAG	X	CGAA	ACAUCAAU	112	ATTGATGT	T	CGTCTGTG	524
908	ACACAGAC	CUGAUGAG	X	CGAA	AACAUCAA	113	TTGATGTT	C	GTCTGTGT	525
911	AUCAACAC	CUGAUGAG	X	CGAA	ACGAACAU	114	ATGTTGCT	C	TGTTGAT	526
922	GCCUACAC	CUGAUGAG	X	CGAA	ACAUCACA	115	TGTGATGT	T	GGTGAGGC	527
934	ACUUCUUG	CUGAUGAG	X	CGAA	AUGGCCUC	116	GAGGCCAT	C	CAAGAAGT	528
943	GACUCCAU	CUGAUGAG	X	CGAA	ACUUCUUG	117	CAAGAAGT	T	ATGAGTGC	529
944	GGACUCCA	CUGAUGAG	X	CGAA	AACUUCUU	118	AAGAAGTT	A	TGGAGTCC	530
951	CUUCAUG	CUGAUGAG	X	CGAA	ACUCCAUA	119	TATGAGGT	C	CTATGAAG	531
954	CAACUCCA	CUGAUGAG	X	CGAA	AGGACUCC	120	GGAGTCTT	A	TGAAGTTG	532
961	UCUAUUC	CUGAUGAG	X	CGAA	ACUCCAUA	121	TATGAAGT	T	GAATAGA	533
967	UUCCAUUC	CUGAUGAG	X	CGAA	AUUUCAAC	122	GTTGAAGT	A	GATGGGAA	534
981	UCACUUGA	CUGAUGAG	X	CGAA	AUGUCUUC	123	GAAGCAT	A	TCAAGTGA	535
983	UUUACAUU	CUGAUGAG	X	CGAA	AUAUGUCU	124	AGACATAT	C	AAGTGAAA	536
997	AGAUUACG	CUGAUGAG	X	CGAA	AUUGGUUU	125	AAACCAAT	C	CGTAATCT	537
1001	AUUUAGAU	CUGAUGAG	X	CGAA	ACGGAUUG	126	CAATCGGT	A	ATCTAAAT	538
1004	UCCAUAUA	CUGAUGAG	X	CGAA	AUUACGGA	127	TCCGTAAT	C	TAAATGGA	539
1006	UGUCCAUA	CUGAUGAG	X	CGAA	AGAUUACG	128	CGTAATCT	A	AATGGACA	540
1016	CCCAAUUG	CUGAUGAG	X	CGAA	AUUGCCAU	129	ATGGACAT	T	CAATTGGG	541
1017	GCCCCAUU	CUGAUGAG	X	CGAA	AAUGUCCA	130	TGGACATT	C	AATTGGGC	542
1021	UAUUGCCC	CUGAUGAG	X	CGAA	AUUGAAGU	131	CATTCAAT	T	GCGCAATA	543
1029	GUUAUCCA	CUGAUGAG	X	CGAA	AUUGCCCA	132	TGGGCAAT	A	TAGAATAC	544
1031	AUGUAUUC	CUGAUGAG	X	CGAA	AUAUUGCC	133	CGCAATAT	A	GAATACAT	545
1036	CCAGCAUG	CUGAUGAG	X	CGAA	AUUCUAUA	134	TATAGAAT	A	CATGCTGG	546
1060	CCUUUAC	CUGAUGAG	X	CGAA	AUUGGCAC	135	GTGCGCAT	T	GTGAAAGG	547
1102	AUUGCAUA	CUGAUGAG	X	CGAA	AUUCUCC	136	GGAGAAGT	A	TATGCAAT	548

Table 9

1104	CANUUGCA	CUGAUGAG	X	CGAA	AUACUUCU	137	AGAAGTAT	A	TGCAATTG	549
1111	AAGGUUUC	CUGAUGAG	X	CGAA	AUUGCAUA	138	TATGCAAT	T	GAAACCTT	550
1119	UACUACCA	CUGAUGAG	X	CGAA	AGGUUUA	139	TGAAACCT	T	TGOTAGTA	551
1120	GUACUACC	CUGAUGAG	X	CGAA	AAGGUUUC	140	GAAACCTT	T	GGTAGTAC	552
1124	UCCUGUAC	CUGAUGAG	X	CGAA	ACCAAAGG	141	CCTTTGGT	A	GTACAGGA	553
1127	UUUUCUCC	CUGAUGAG	X	CGAA	ACUACCAA	142	TTGGTAGT	A	CAGGAAAA	554
1141	UCAUGAAC	CUGAUGAG	X	CGAA	ACACCUUU	143	AAAGGTTG	T	GTTCATGA	555
1144	UCAUCAUG	CUGAUGAG	X	CGAA	ACAACACC	144	GGTGTGTG	T	CATGATGA	556
1145	AUCAUCAU	CUGAUGAG	X	CGAA	AACAACAC	145	GTGTGTGT	C	ATGATGAT	557
1154	ACAUUCCA	CUGAUGAG	X	CGAA	AUCAUCAU	146	ATGATGAT	A	TGGAATGT	558
1163	GUAAUGUG	CUGAUGAG	X	CGAA	ACAUCCA	147	TGGAATGT	T	CACATTAC	559
1164	UGUAAUGU	CUGAUGAG	X	CGAA	AACAUUCC	148	GGATGTGT	C	ACATTACA	560
1169	UUUCAUGU	CUGAUGAG	X	CGAA	AUGUGAAC	149	GTTCACAT	T	ACATGAAA	561
1170	UUUJCAUG	CUGAUGAG	X	CGAA	AAUGUGAA	150	TTACACAT	T	ACATGAAA	562
1181	AACAUCAA	CUGAUGAG	X	CGAA	AUUUUUUA	151	TGAAAAAT	T	TTGATGTT	563
1182	CAACAUCA	CUGAUGAG	X	CGAA	AAUUUUUC	152	GAAGGTTT	T	TGATTTTG	564
1183	CCAACAUC	CUGAUGAG	X	CGAA	AAAUUUUU	153	AAAAATTT	T	GATGTTGG	565
1189	ACAUUGCC	CUGAUGAG	X	CGAA	ACAUCAAA	154	TTTGATGT	T	GGACATGT	566
1204	OGAAGCCU	CUGAUGAG	X	CGAA	AUUGGCAC	155	GTTCACAT	A	AGGCTTCC	567
1210	GUUCUUGG	CUGAUGAG	X	CGAA	AGCCUUUU	156	ATAAGGCT	T	CCAAGAAC	568
1211	UGUUUCUG	CUGAUGAG	X	CGAA	AAGCCUUA	157	TAAAGGCT	C	CAGAAGAC	569
1227	CAUUAUAC	CUGAUGAG	X	CGAA	AGUGUUUU	158	AAAAACCT	T	GTAAAAATG	570
1230	UGACAUUU	CUGAUGAG	X	CGAA	ACAAGUGU	159	ACACTTGT	T	AAATGTCA	571
1231	AUGACAUT	CUGAUGAG	X	CGAA	AACAAGUG	160	CACITGTT	A	AATGTTCAT	572
1237	UCAUUGAU	CUGAUGAG	X	CGAA	ACAUUUAA	161	TTAAATGT	C	ATCAATGA	573
1240	UUUUAUUA	CUGAUGAG	X	CGAA	AUGACAUT	162	AATGTCACT	C	AATGAAAA	574
1251	GGGUUCCA	CUGAUGAG	X	CGAA	AGUUUUUA	163	TGAAAACT	T	TGGAACCC	575
1252	AGGGUUCU	CUGAUGAG	X	CGAA	AAGUUUUC	164	GAAAACTT	T	GGAACCTT	576
1261	CAGAAGGC	CUGAUGAG	X	CGAA	AGGGUUCU	165	GGAACCTT	T	GCCTTCTG	577
1266	UGCGGCGC	CUGAUGAG	X	CGAA	AGGCAAGG	166	CCTTGACT	T	CTGCCGCA	578
1267	CUGCGGCA	CUGAUGAG	X	CGAA	AAGGCAAG	167	CTTGCTTT	C	TGCCGCGC	579
1286	UCCCAAGC	CUGAUGAG	X	CGAA	AUCCAGCC	168	GGCTGACT	C	GCTTGGGA	580
1290	UUUCUCCC	CUGAUGAG	X	CGAA	AGCGAUCC	169	GGATCGCT	T	GGGAGAAA	581
1301	CAAGUAUU	CUGAUGAG	X	CGAA	ACUUUUCU	170	GAGAAAGT	A	AATACTTG	582
1305	CCAUCAGC	CUGAUGAG	X	CGAA	AUUUAUUU	171	AAGTAAAT	A	CTTGATGG	583
1308	GAGCCAUC	CUGAUGAG	X	CGAA	AGUAUUUA	172	TAAATACT	T	GATGGCTC	584
1316	AUUCUUAU	CUGAUGAG	X	CGAA	AGCCAUCA	173	TGATGGCT	C	TGAAGAA	585
1325	GUACACAC	CUGAUGAG	X	CGAA	AUUCUUAU	174	TGAAGAA	T	TGTGTGAC	586
1335	CAUUGCCC	CUGAUGAG	X	CGAA	AGUCACAC	175	GTGTGACT	T	GGCATTG	587
1342	GGAUUACU	CUGAUGAG	X	CGAA	AUGGCCAA	176	TTGGGCAT	T	GTAGATCC	588
1345	UAUUGAUC	CUGAUGAG	X	CGAA	ACAAUGCC	177	GGCATTTG	A	GATCCATA	589
1349	UGGAUAUG	CUGAUGAG	X	CGAA	AUCUACAA	178	TTGTAGAT	C	CATATCCA	590
1353	AUGGUGGA	CUGAUGAG	X	CGAA	AUGGAUUC	179	AGATCCAT	A	TCCACCAT	591
1355	UAUUGGUG	CUGAUGAG	X	CGAA	AUAUGGAU	180	ATCCATAT	C	CACATTAT	592
1362	UGUCACAU	CUGAUGAG	X	CGAA	AUGGUGGA	181	TCCACCAT	T	ATGTGACA	593
1363	AUGUCACA	CUGAUGAG	X	CGAA	AUUGGUGG	182	CCACCATT	A	TGTGACAT	594
1372	GAUCCUUU	CUGAUGAG	X	CGAA	AUGUCACA	183	TGTGACAT	T	AAAGGATC	595

Table 9

1373	UGAUCCUU	CUGAUGAG	X	CGAA	AAUGUCAC	184	GTGACATT	A	AAGGATCA	596
1380	CUGUAUAA	CUGAUGAG	X	CGAA	AUCCUUA	185	TAAAGGAT	C	ATATACAG	597
1383	GCUCUGUA	CUGAUGAG	X	CGAA	AUGAUCCU	186	AGGATCAT	A	TACAGCGC	598
1385	UUGCGGCU	CUGAUGAG	X	CGAA	AUAUGAUC	187	GATCATAT	A	CAGCGCAA	599
1395	UAUGUUAU	CUGAUGAG	X	CGAA	AUUGGCGU	188	AGCGCAAT	T	TGAACATA	600
1396	GAUGGUUC	CUGAUGAG	X	CGAA	AAUUGGCG	189	GGCGAATT	T	GAACATAC	601
1403	CAGGAUGG	CUGAUGAG	X	CGAA	AUGUCAA	190	TTGAACAT	A	CCATCTCG	602
1408	CGCAACAG	CUGAUGAG	X	CGAA	AUGGUAUG	191	CATACCAT	C	CTGTTGCG	603
1413	UUGGACGC	CUGAUGAG	X	CGAA	ACAGGAUG	192	CATCTGTT	T	CGCTCCAA	604
1418	ACAUGUUG	CUGAUGAG	X	CGAA	ACGCAACA	193	TGTTGCTT	C	CAACATGT	605
1427	AACUUCUU	CUGAUGAG	X	CGAA	ACAUGUUG	194	CAACATGT	A	AAGAAGTT	606
1435	CUGCUGAC	CUGAUGAG	X	CGAA	ACUUCUUU	195	AAAGAAGT	T	GTCAGCAG	607
1438	CCUCUGCU	CUGAUGAG	X	CGAA	ACAACUUC	196	GAAGTTGT	C	AGCAGAGG	608
1455	AAGUUUAA	CUGAUGAG	X	CGAA	AGUCAUCU	197	AGATGACT	A	TTAAACTT	609
1457	CUAAGUUU	CUGAUGAG	X	CGAA	AUAGUCAU	198	ATGACTAT	T	AAACTTAG	610
1458	ACTUAGUU	CUGAUGAG	X	CGAA	AAUAGUCA	199	TGACTATT	A	AACCTTAG	611
1463	UUUGGACU	CUGAUGAG	X	CGAA	AGUUUAAU	200	ATTAAACT	T	AGTCCAAA	612
1464	CUUUGGAC	CUGAUGAG	X	CGAA	AAGUUUAA	201	TTAAACTT	A	GTCCAAAG	613
1467	UGGCUUUG	CUGAUGAG	X	CGAA	ACUAAAGU	202	AACTTACT	C	CAAAAGCA	614
1479	AAGGUUGU	CUGAUGAG	X	CGAA	AGGUUGGU	203	AGCCACTT	C	AACACTTT	615
1487	AGAAAUUA	CUGAUGAG	X	CGAA	AGGUUGGU	204	CAACACTT	T	TATTTTCT	616
1488	CAGAAAUU	CUGAUGAG	X	CGAA	AAGGUUGU	205	AACACTTT	T	ATTTTCTG	617
1489	UCAGAAUA	CUGAUGAG	X	CGAA	AAAGGUUG	206	ACACTTTT	A	TTTTCTGA	618
1491	GCUCAGAA	CUGAUGAG	X	CGAA	AUAAAGGU	207	ACCTTTAT	T	TTCTGAGC	619
1492	AGCUCAGA	CUGAUGAG	X	CGAA	AAUAAAGG	208	CCTTTATT	T	TCTGAGCT	620
1493	AAGCUCAG	CUGAUGAG	X	CGAA	AAAUAAAG	209	CTTTATTT	T	CTGAGCTT	621
1494	AAAGCUCU	CUGAUGAG	X	CGAA	AAAUAAAA	210	TTTATTTT	C	TGAGCTTT	622
1501	UUCCAACA	CUGAUGAG	X	CGAA	AGCUCAGA	211	TCTGAGCT	T	TGTTGGAA	623
1502	UUUCACAC	CUGAUGAG	X	CGAA	AAGCUCAG	212	CTGAGCTT	T	GTTGGAAA	624
1505	UGUUUUCC	CUGAUGAG	X	CGAA	ACMAAGCU	213	AGCTTTGT	T	GGAAACA	625
1518	AAUUCUGG	CUGAUGAG	X	CGAA	AUCAUGUU	214	AACATGAT	A	CAGAAATT	626
1526	GGCAAAUU	CUGAUGAG	X	CGAA	AUUCUGGU	215	ACCAAGAT	T	AAITGGCC	627
1527	UUGCAAAU	CUGAUGAG	X	CGAA	AAUUCUGG	216	CCAGAAAT	A	ATTTGCCA	628
1530	AUGUGGCA	CUGAUGAG	X	CGAA	AUUAUUUC	217	GAATTAAT	T	TGCCACAT	629
1531	CAUGUGGC	CUGAUGAG	X	CGAA	AAUUAUUU	218	AAATTAAT	T	GCCACATG	630
1541	AAACAGAC	CUGAUGAG	X	CGAA	ACAUGUGG	219	CCACATGT	T	GTCGTTT	631
1544	UUAACAAC	CUGAUGAG	X	CGAA	ACAACAUG	220	CATGTTGT	C	TGTTTAA	632
1548	ACUGUUAU	CUGAUGAG	X	CGAA	ACAGACAA	221	TGTCGTGT	T	TACACATG	633
1549	CACUGUUA	CUGAUGAG	X	CGAA	AACAGACA	222	GTGCTGTT	T	CAACAGTG	634
1550	CCACUGUU	CUGAUGAG	X	CGAA	AAACAGAC	223	GTCTGTTT	T	AACAGTGG	635
1551	UCCACUGU	CUGAUGAG	X	CGAA	AAACACAGA	224	TCTGTTT	A	ACAGTGGG	636
1567	AAAAUUUU	CUGAUGAG	X	CGAA	ACAUGGCU	225	ACCCATGT	A	ATCTTTT	637
1570	GAUAAAGG	CUGAUGAG	X	CGAA	AUUAACAUG	226	CATGTAAT	A	CTTTTATC	638
1573	AUGGAUAA	CUGAUGAG	X	CGAA	AGUAUUAC	227	GTAATACT	T	TTATCCAT	639
1574	CAUGGAUA	CUGAUGAG	X	CGAA	AAGUAUUA	228	TAATTAAT	T	TATCCATG	640
1575	ACAUGGAU	CUGAUGAG	X	CGAA	AAAGUAUU	229	ATACTTTT	T	ATCCATGT	641
1576	AAACUGGA	CUGAUGAG	X	CGAA	AAAAGUAU	230	ATACTTTT	A	TCCATGTT	642

Table 9

1578	UAAACAUG	CUGAUGAG	X	CGAA	AUAAAAGU	231	ACTTTTAT	C	CATGTTTA	643
1584	CUUUUUUA	CUGAUGAG	X	CGAA	ACAUGGAU	232	ATCCATGT	T	TAAAAAAG	644
1585	UCUUUUUU	CUGAUGAG	X	CGAA	AACAUGGA	233	TCCAATGT	T	AAAAAAGA	645
1586	UUUUUUUU	CUGAUGAG	X	CGAA	AAACAUGG	234	CCATGTTT	A	AAAAAGAA	646
1600	UUUGUCCA	CUGAUGAG	X	CGAA	AUUCUUC	235	GAAGGAAT	T	TGGACAAA	647
1601	CUUUGUCC	CUGAUGAG	X	CGAA	AUUUCCUU	236	AAGGAAT	T	GGACAAAG	648
1619	UUACAUAU	CUGAUGAG	X	CGAA	ACGUUUUG	237	CAAAACGT	C	TAATGTAA	649
1621	AAUUACAU	CUGAUGAG	X	CGAA	AGACGGUU	238	AACCGTCT	A	ATGTAAAT	650
1626	UGGUUAUU	CUGAUGAG	X	CGAA	ACAUUAGA	239	TCTAAATG	A	ATTAACCA	651
1629	CGUUGUUU	CUGAUGAG	X	CGAA	AUUACAUA	240	AATGTAAAT	T	AACCAACG	652
1630	UCGUUGGU	CUGAUGAG	X	CGAA	AAUUACAU	241	ATGTAAAT	A	ACCAACGA	653
1646	AGUCCGGA	CUGAUGAG	X	CGAA	AGCUUUUU	242	AAAAAGCT	T	TCCGGACT	654
1647	AAGUCCGG	CUGAUGAG	X	CGAA	AAGCUUUU	243	AAAAGCTT	T	CCGGACTT	655
1648	AAAGUCCG	CUGAUGAG	X	CGAA	AAAGCUUU	244	AAAGCTTT	C	CGGACTTT	656
1655	GCAUUUAA	CUGAUGAG	X	CGAA	AGUCCGGA	245	TCCGGACT	T	TAAATGCT	657
1656	AGCAUUUA	CUGAUGAG	X	CGAA	AAGUCCGG	246	CCGGACTT	T	TAAATGCT	658
1657	UAGCAUUU	CUGAUGAG	X	CGAA	AAAGUCCG	247	CGGACTTT	T	AAATGCTA	659
1658	UUAGCAUU	CUGAUGAG	X	CGAA	AAAAGUCC	248	GGACTTTT	A	AATGCTAA	660
1665	AAAACAGU	CUGAUGAG	X	CGAA	AGCAUUUA	249	TAAATGCT	A	ACTGTTTT	661
1671	AGGGGAAA	CUGAUGAG	X	CGAA	ACAGUUUAG	250	CTAATGCT	T	TTTCCCTT	662
1672	AAGGGGAA	CUGAUGAG	X	CGAA	AACAGUUU	251	TAATGTTT	T	TTCCTCTT	663
1673	GAAGGGGA	CUGAUGAG	X	CGAA	AAACAGUU	252	AACTGTTT	T	TCCCTCTC	664
1674	GGAAAGGG	CUGAUGAG	X	CGAA	AAAACAGU	253	ACTGTTTT	T	CCCTTCTC	665
1675	AGGAAGGG	CUGAUGAG	X	CGAA	AAAACAGG	254	CTGTTTTT	C	CCCTTCTT	666
1680	UAGACAGG	CUGAUGAG	X	CGAA	AGGGGAAA	255	TTTCCCTT	T	CCTGCTTA	667
1681	CUAGACAG	CUGAUGAG	X	CGAA	AAGGGGAA	256	TTCCCTCT	C	CTGTCTAG	668
1686	UUUUCCUA	CUGAUGAG	X	CGAA	ACAGGAAG	257	CTTCTGTT	C	TAGGAAAA	669
1688	CAUUUUCC	CUGAUGAG	X	CGAA	AGACAGGA	258	TCCTGTCT	A	GGAAAAATG	670
1699	GAGCUUUA	CUGAUGAG	X	CGAA	AGCAUUUU	259	AAAATGCT	A	TAAAGCTC	671
1701	UUGAGCUU	CUGAUGAG	X	CGAA	AUAGCAUU	260	AATGCTAT	A	AAGTCAAA	672
1707	ACUAAUUU	CUGAUGAG	X	CGAA	AGCUUUUU	261	ATAAGCTC	A	AAATTAGT	673
1712	UCCUAAAU	CUGAUGAG	X	CGAA	AUUUGAGC	262	GCTCAAAAT	T	AGTTAGGA	674
1713	UUCCUAAU	CUGAUGAG	X	CGAA	AAUUGAGC	263	CTCAAAAT	A	TGTAGGAA	675
1716	UCAUCCUU	CUGAUGAG	X	CGAA	ACUAAUUU	264	AAATTAGT	T	AGGAATGA	676
1717	GUCAUJCC	CUGAUGAG	X	CGAA	AACUAAUU	265	AAATTAGT	A	GGAAATGAC	677
1727	AAACGUUA	CUGAUGAG	X	CGAA	AGUCAUUC	266	GAATGACT	T	ATACGTTT	678
1728	AAAACGUA	CUGAUGAG	X	CGAA	AAGUCAUU	267	AATGACTT	A	TACGTTT	679
1730	ACAAAACG	CUGAUGAG	X	CGAA	AUAAGUCA	268	TGACTTAT	A	CGTTTTGT	680
1734	CAAAACAA	CUGAUGAG	X	CGAA	ACGUAAUA	269	TTATAAGT	T	TGTTTTTG	681
1735	UCAAACAA	CUGAUGAG	X	CGAA	AACGUAAU	270	TATACGTT	T	TGTTTTGA	682
1736	UUCAAACG	CUGAUGAG	X	CGAA	AAACGUAA	271	ATACGTTT	T	GTTTTTGAA	683
1739	GUUUUCAA	CUGAUGAG	X	CGAA	ACAAAACG	272	CGTTTTGT	T	TGAAATAC	684
1740	GGUUAUUA	CUGAUGAG	X	CGAA	AAACAAAAC	273	GTTTTTGT	T	TGAATACC	685
1741	AGGUUAUC	CUGAUGAG	X	CGAA	AAACAAA	274	TTTTTGT	T	GAATACCT	686
1746	CUCUUAAG	CUGAUGAG	X	CGAA	AUUCAAAA	275	TTTTGAAT	A	CCTAAGAG	687
1750	GUUUUCUU	CUGAUGAG	X	CGAA	AGGUUAUC	276	GAATACCT	A	AGAGATAC	688
1757	CCAAAAGG	CUGAUGAG	X	CGAA	AUCUUCUA	277	TAAGAGAT	A	CTTTTTGG	689

Table 9

1760	UAUCCAAA	CUGAUGAG	X	CGAA	AGUAUCUC	278	GAGATACT	T	TTTGGATA	690
1761	AUAUCCAA	CUGAUGAG	X	CGAA	AAGUAUCU	279	AGATACTT	T	TGGATAT	691
1762	AAUAUCCA	CUGAUGAG	X	CGAA	AAAGUAUC	280	GATACCTT	T	TGGATATT	692
1763	AAUAUCC	CUGAUGAG	X	CGAA	AAAAGUAU	281	ATACTTTT	T	GGATATT	693
1768	AAUAUAAA	CUGAUGAG	X	CGAA	AUCCAAAA	282	TTTTGGAT	A	TTTATATT	694
1770	GCAUAUA	CUGAUGAG	X	CGAA	AUAUCCAA	283	TGGATATT	T	TATATTGC	695
1771	GGCAUAU	CUGAUGAG	X	CGAA	AAUAUCCA	284	TGGATATT	T	ATATTGCC	696
1772	UGGCAUA	CUGAUGAG	X	CGAA	AAUAUCC	285	GGATATTT	A	TATTGCCA	697
1774	UAUGGCAA	CUGAUGAG	X	CGAA	AUAUAUAU	286	ATATTTAT	A	TTGCCATA	698
1776	AAUAUGGC	CUGAUGAG	X	CGAA	AUAUAUAU	287	ATTATAT	T	GCCATATT	699
1782	AGUAAGAA	CUGAUGAG	X	CGAA	AUGGCAAU	288	ATTGCCAT	A	TTCTTACT	700
1784	CAAGUAAG	CUGAUGAG	X	CGAA	AUAUGGCA	289	TGCCATAT	T	CTTACTTG	701
1785	UCAAGUA	CUGAUGAG	X	CGAA	AAUAUGGC	290	GCCATATT	C	TTACTTGA	702
1787	AUUCAGU	CUGAUGAG	X	CGAA	AGAUAUUG	291	CATATTCT	T	ACTTGAAT	703
1788	CAUUCAG	CUGAUGAG	X	CGAA	AAGAAUUC	292	ATATTTCT	A	CTTGAATG	704
1791	AAGCAUUC	CUGAUGAG	X	CGAA	AGUAAGAA	293	TTCTTACT	T	GAATGCTT	705
1799	GUAUUA	CUGAUGAG	X	CGAA	AGCAUUA	294	TGAATGCT	T	TGAATGAC	706
1800	AGUCAUUC	CUGAUGAG	X	CGAA	AAGCAUUC	295	GAATGCTT	T	GAATGACT	707
1809	ACUGGAUG	CUGAUGAG	X	CGAA	AGUCAUUC	296	GAATGACT	A	CATCCAGT	708
1813	CAGAUCU	CUGAUGAG	X	CGAA	AUGUAGUC	297	GACTACAT	C	CAGTCTCG	709
1818	AGGUGCAG	CUGAUGAG	X	CGAA	ACUGGAUG	298	CATCCAGT	T	CTGCACCT	710
1819	UAGGUGCA	CUGAUGAG	X	CGAA	AACUGGAU	299	ATCCAGTT	C	TGCACCTA	711
1827	AGAGGUUA	CUGAUGAG	X	CGAA	AGGUGCAG	300	CTGCACCT	A	TACCTCT	712
1829	CCAGAGGG	CUGAUGAG	X	CGAA	AUAGGUGC	301	GCACCTAT	A	CCCTCTGG	713
1834	CAACACCA	CUGAUGAG	X	CGAA	AGGUAUA	302	TATACCTT	C	TGGTGTG	714
1841	UAAAAAGC	CUGAUGAG	X	CGAA	ACACCAGA	303	TCTGTGT	T	GCTTTTAA	715
1845	AGGUUAAA	CUGAUGAG	X	CGAA	AGCAACAC	304	GTGTGTCT	T	TTTAACCT	716
1846	AAGGUUAA	CUGAUGAG	X	CGAA	AAGCAACA	305	TGTTGCTT	T	TTAACCTT	717
1847	GAAGGUUA	CUGAUGAG	X	CGAA	AAAGCAAC	306	GTGTGCTT	T	TAACCTTC	718
1848	GGAAAGUU	CUGAUGAG	X	CGAA	AAAAGCAA	307	TTGTCTTT	T	AACCTTCC	719
1849	AGGAAGGU	CUGAUGAG	X	CGAA	AAAAAGCA	308	TGCTTTTT	A	ACCTTCT	720
1854	AUUCACAG	CUGAUGAG	X	CGAA	AGGUUAAA	309	TTTAACCT	T	CTTGGAA	721
1855	GAUUCAG	CUGAUGAG	X	CGAA	AAGGUUAA	310	TTAACCTT	C	CTGGAATC	722
1863	AGAAAAGU	CUGAUGAG	X	CGAA	AUCCACAG	311	CCTGGAAT	C	CATTTTCT	723
1867	UUUUAGAA	CUGAUGAG	X	CGAA	AUGGAUUC	312	GAATCCAT	T	TCTTAAAA	724
1868	UUUUUAGA	CUGAUGAG	X	CGAA	AUUGGAUU	313	ATTTCTT	A	AAAAATAA	725
1869	UUUUUJAG	CUGAUGAG	X	CGAA	AAUUGGAU	314	ATCCATTT	T	CTAAAAAA	726
1870	AUUUUUA	CUGAUGAG	X	CGAA	AAAAUUGA	315	TCCATTTT	C	TAAAAAAT	727
1872	UUUUUUU	CUGAUGAG	X	CGAA	AGAAAAUG	316	CATTTCT	A	AAAAATAA	728
1879	UUUUUUU	CUGAUGAG	X	CGAA	AUUUUUA	317	TAAAAAAT	A	AAGACACA	729
1889	CUGAGAAG	CUGAUGAG	X	CGAA	AUGUGUCU	318	AGACACAT	T	CTTCTCAG	730
1890	CGUGAGAA	CUGAUGAG	X	CGAA	AAUUGUC	319	GACACATT	T	TCTTCAGC	731
1892	GUGCUGAG	CUGAUGAG	X	CGAA	AGAAUGUG	320	CACATTCT	T	CTCAGCAC	732
1893	GGUGCUGA	CUGAUGAG	X	CGAA	AGAAUUGU	321	ACATTTCT	C	TCAGCACC	733
1895	GUGGUGCU	CUGAUGAG	X	CGAA	AGAAAGAAU	322	ATTCTTCT	C	AGCACCAC	734
1913	UUUUGGAA	CUGAUGAG	X	CGAA	AGUGUGUG	323	CAACACCT	A	TTCCAAAA	735
1915	GAUUUGUG	CUGAUGAG	X	CGAA	AUAGGUGU	324	ACACCTAT	T	CCAAAAATC	736

Table 9

1916	CGAUUUUG	CUGAUGAG	X	CGAA	AAUAGGUG	325	CACCTATT	C	CAAAATCG	737
1923	AUGUGGUC	CUGAUGAG	X	CGAA	AUUUUGGA	326	TCCAAAAT	C	GACCACAT	738
1932	CUUCCAAA	CUGAUGAG	X	CGAA	AUGUGGUC	327	GACCACAT	A	TTGGGAAG	739
1934	UACUUCCA	CUGAUGAG	X	CGAA	AUAUGUGG	328	CCACATAT	T	TGGAAGTA	740
1935	UUACUUCC	CUGAUGAG	X	CGAA	AAUUGUG	329	CACATATT	T	GGAGTAA	741
1942	GAGAGCUU	CUGAUGAG	X	CGAA	ACUUCCAA	330	TGGGAAGT	A	AAGCTCTC	742
1948	GCUGAGGA	CUGAUGAG	X	CGAA	AGCUUUC	331	GTAAAGCT	C	TCCTCAGC	743
1950	UUGCUGAG	CUGAUGAG	X	CGAA	AGAGCUUU	332	AAAGCTCT	C	CTCAGCAA	744
1953	CAUUUGCU	CUGAUGAG	X	CGAA	AGGAGAGC	333	GCTCTCCT	C	AGCAATGT	745
1963	UGUUCUUU	CUGAUGAG	X	CGAA	ACAUUUGC	334	GCAAAAGT	A	AAAGAACAA	746
1977	UUUGUUUU	CUGAUGAG	X	CGAA	AUUUCUGU	335	ACAGAAAT	T	ATAACAAA	747
1978	GUUUUUUA	CUGAUGAG	X	CGAA	AAUUCUG	336	CAGAAATT	A	TAACAAA	748
1980	CAGUUUGU	CUGAUGAG	X	CGAA	AUAAUUUC	337	GAAATTAT	A	ACAACTGT	749
1990	GUUCUGAG	CUGAUGAG	X	CGAA	ACAGUUUG	338	CAAACTGT	C	TCCTCAGC	750
1992	UGGUUGUA	CUGAUGAG	X	CGAA	AGACAGUU	339	AAGTCTGT	C	TCAGACCA	751
1994	UGUGUUCU	CUGAUGAG	X	CGAA	AGAGACAG	340	CTGTCTCT	C	AGACACAA	752
2005	UUUGUUUA	CUGAUGAG	X	CGAA	ACUGUGGU	341	ACCACAGT	A	TAACCAAA	753
2007	AGUUUGGU	CUGAUGAG	X	CGAA	AUACUGUG	342	CACAGTAT	A	ACCAAACT	754
2016	CUGAGUUC	CUGAUGAG	X	CGAA	AGUUUGGU	343	ACCAAACT	A	GAACCTCAG	755
2022	UUAAUCCU	CUGAUGAG	X	CGAA	AGUUUCUAG	344	CTAGACAT	C	AGGATTAA	756
2028	AGUUUCUU	CUGAUGAG	X	CGAA	AUCCUGAG	345	CTCAGGAT	T	AAGAAACT	757
2029	GAGUUUCU	CUGAUGAG	X	CGAA	AAUCCUGA	346	TCAGGATT	A	AGAAACTC	758
2037	UUUUGAGU	CUGAUGAG	X	CGAA	AGUUUCUU	347	AAGAAACT	C	ACTCAAAA	759
2041	GUGGUUUU	CUGAUGAG	X	CGAA	AGUGAGUU	348	AAGTCTCT	C	AAACACAC	760
2056	UUUCCAUU	CUGAUGAG	X	CGAA	AGUUUGGU	349	ACACAACAT	A	CATGGAAA	761
2079	UCAUCCAG	CUGAUGAG	X	CGAA	AGCAGGUU	350	AACCTGCT	C	CTGAATGA	762
2090	GUUCCAGG	CUGAUGAG	X	CGAA	AGUCAUUC	351	GAATGACT	A	CTGGATAC	763
2097	UUUUUUGU	CUGAUGAG	X	CGAA	AUCCAGUA	352	TACTGGAT	A	CATAACAA	764
2101	CAUUUUUG	CUGAUGAG	X	CGAA	AUGUAUCC	353	GCATACAT	A	ACAAAATG	765
2121	AACAUCUU	CUGAUGAG	X	CGAA	AUUUCUGC	354	GCAGAAAT	A	AAGATGTT	766
2129	UUUUAAAG	CUGAUGAG	X	CGAA	ACAUUUUU	355	AAAGATGT	T	CTTTAAAA	767
2130	GUUUUAAA	CUGAUGAG	X	CGAA	AACAUCUU	356	AAGATGTT	C	TTTTAAAC	768
2132	UGGUUUUA	CUGAUGAG	X	CGAA	AGAAACAU	357	GATGTCTT	T	TAAACCCA	769
2133	UUUGUUUU	CUGAUGAG	X	CGAA	AAGAACAU	358	ATGTCTCT	T	AAAACCAA	770
2134	AUUUGUUU	CUGAUGAG	X	CGAA	AAAGAACAA	359	TGTTCTTT	A	AAACCAAT	771
2162	GAUUCUGG	CUGAUGAG	X	CGAA	AUGUUGUG	360	CACACAT	A	CCAGAACT	772
2170	GUCCACGA	CUGAUGAG	X	CGAA	AUUCUGGU	361	ACCAGAACT	C	TCCTGGAC	773
2172	GUGUCCCA	CUGAUGAG	X	CGAA	AGAUUCUG	362	CAGAACTC	C	TGGACAC	774
2183	CUGUCUUU	CUGAUGAG	X	CGAA	AUGUGUCC	363	GGACACAT	T	CAAGCAG	775
2184	ACUGCUUU	CUGAUGAG	X	CGAA	AAUGUGUC	364	GACATCTT	C	AAAGCAGT	776
2197	UUUCCCUU	CUGAUGAG	X	CGAA	ACACACUG	365	CAGTGTGT	A	GAGGAAA	777
2207	GUGCUAAA	CUGAUGAG	X	CGAA	AUUUCCCU	366	AGGGAAT	T	TATAGCAC	778
2208	AGUCCUUA	CUGAUGAG	X	CGAA	AAUUUCCC	367	GGGAATTT	T	ATAGCACT	779
2209	UAGUGCUA	CUGAUGAG	X	CGAA	AAAUUCCC	368	GGAAATTT	A	TAGCACTA	780
2211	UUUAGUGC	CUGAUGAG	X	CGAA	AUAAAUUU	369	AAATTTAT	A	GCACTAAA	781
2217	UGGCAUUA	CUGAUGAG	X	CGAA	AGUGCUAU	370	ATAGCACT	A	AATGCCCA	782
2244	AUUUUGAA	CUGAUGAG	X	CGAA	AUUUCCUG	371	CAGGAAT	A	TCTAAAT	783

Table 9

2246	CAAUUUUA	CUGAUGAG	X	CGAA	AUAUUUCC	372	GGAAATAT	C	TAAAAATTG	784
2248	GUCAAUUU	CUGAUGAG	X	CGAA	AGAUUUUU	373	AAATATCT	A	AAATTGAC	785
2253	AGGGUGUC	CUGAUGAG	X	CGAA	AUUUUAGA	374	TCTAAAAT	T	GACACCCCT	786
2262	UGUGAGUG	CUGAUGAG	X	CGAA	AGGGUGUC	375	GACACCCCT	A	ACATCACA	787
2267	UUAAUUGU	CUGAUGAG	X	CGAA	AUGUUAGG	376	CCTAACAT	C	ACAATTAA	788
2273	GUUCUUUU	CUGAUGAG	X	CGAA	AUUGUGAU	377	ATCACAAT	T	AAAAGAAC	789
2274	AGUUCUUU	CUGAUGAG	X	CGAA	AAUUGUGA	378	TCACAAAT	A	AAAGAACT	790
2283	UGCUUCUC	CUGAUGAG	X	CGAA	AGUUCUUU	379	AAAGAACT	A	GAGAAGCA	791
2305	AGCUUUUC	CUGAUGAG	X	CGAA	AUGUGUUU	380	AAACACAT	T	GAAGAGCT	792
2314	CCUUCUCU	CUGAUGAG	X	CGAA	AGCUUUUC	381	GAAGAGCT	A	AGAGAAGG	793
2331	AUCUUAAG	CUGAUGAG	X	CGAA	AUUCUUG	382	CAAGAAT	A	ACTAAGAT	794
2335	UCUGAUCU	CUGAUGAG	X	CGAA	AGUUAUUU	383	AAATAACT	A	AGATCAGA	795
2340	UCUCGUCU	CUGAUGAG	X	CGAA	AUCUUAAG	384	ACTAAGAT	C	AGAGCAGA	796
2361	UGUGUCUC	CUGAUGAG	X	CGAA	AUUUCCUU	385	AAGGAACT	A	GAGCAGA	797
2377	UUUUUGAA	CUGAUGAG	X	CGAA	AGUUUUUU	386	AAAAAACT	C	TTCAAAA	798
2379	AUUUUUUG	CUGAUGAG	X	CGAA	AGAGUUUU	387	AAAACTCT	T	CAAAAAAT	799
2380	GAUUUUUU	CUGAUGAG	X	CGAA	AAGAGUUU	388	AACTCTTT	C	AAAAAATC	800
2388	GAUUAUUU	CUGAUGAG	X	CGAA	AUUUUUUG	389	CAAAAAAT	C	AATGAATC	801
2396	AGUCUUGU	CUGAUGAG	X	CGAA	AUUUAUUU	390	CAATGAAT	C	CAGGAGCT	802
2408	UUUCAAUA	CUGAUGAG	X	CGAA	ACCAGCUC	391	GAGCTGGT	T	TTTTGAAA	803
2409	GUUUCAAU	CUGAUGAG	X	CGAA	AACCAGCU	392	AGCTGGTT	T	TTTTGAAAC	804
2410	CGUUUCAA	CUGAUGAG	X	CGAA	AAACCAGC	393	GCTGGTTT	T	TTGAAACG	805
2411	UCGUUUUA	CUGAUGAG	X	CGAA	AAAACCAG	394	CTGGTTTT	T	TGAAACGA	806
2412	AUCGUUUU	CUGAUGAG	X	CGAA	AAAAACCA	395	TGGTTTTT	T	GAACCGAT	807
2421	AUUUUUGU	CUGAUGAG	X	CGAA	AUCGUUUU	396	GAACGAT	C	AACAAAT	808
2430	UGUCUAUC	CUGAUGAG	X	CGAA	AUUUUUGU	397	AACAAAT	T	GATAGACA	809
2434	CUAGUGUC	CUGAUGAG	X	CGAA	AUCAUUU	398	AAATTGAT	A	GACACTAG	810
2441	AGUCUUGC	CUGAUGAG	X	CGAA	AGUGUCUA	399	TAGACACT	A	GCAAGACT	811
2450	UUUUUUUA	CUGAUGAG	X	CGAA	AGUCUUGC	400	GCAAGACT	A	ATAAGAA	812
2453	UUUCUUUU	CUGAUGAG	X	CGAA	AUUAGUCU	401	AGACTAAT	A	AAGAAGAA	813
2475	UUUUAUUU	CUGAUGAG	X	CGAA	AUUUCUUC	402	AGAGAAT	C	AAATAGAA	814
2480	AUUGCUUC	CUGAUGAG	X	CGAA	AUUUGAUU	403	AATCAAAAT	A	GAAGCAAT	815
2489	UUAUUUUU	CUGAUGAG	X	CGAA	AUUGCUUC	404	GAAGCAAT	A	AAAAATGA	816
2499	AUCCUUUU	CUGAUGAG	X	CGAA	AUCAUUUU	405	AAATTGAT	A	AAGGGGAT	817
2508	GGUGUGUA	CUGAUGAG	X	CGAA	AUCCUUUU	406	AAGGGGAT	A	TCACCACC	818
2510	UUGUGUGU	CUGAUGAG	X	CGAA	AUAUCCCC	407	GGGGATAT	C	ACCACCAC	819
2520	UUUCUGUG	CUGAUGAG	X	CGAA	AUUGUGUG	408	CCACCAAT	C	CCACAGAA	820
2531	UGUGUGUU	CUGAUGAG	X	CGAA	AUUUCUGU	409	ACAGAAT	A	AACACACA	821
2541	UAUUCUCU	CUGAUGAG	X	CGAA	AUGUGUGU	410	ACCACCAAT	C	AGAGAATA	822
2549	GUUUGUAG	CUGAUGAG	X	CGAA	AUUUCUCU	411	ACAGAAT	A	CTACAAAC	823
2552	GGUGUUUG	CUGAUGAG	X	CGAA	AGUAUUUU	412	AGAACTAT	A	CAACACAC	824

Input Sequence = HSU29607. Cut Site = UH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)

Seq1 = HSU29607 (Human methionine aminopeptidase mRNA, complete cds., 2569 bp)

Table 10

Table 10: Human methionine aminopeptidase type 2 (MetAP-2) NCH Ribozyme and Target Sequence

Nt. position	Ribozyme Sequence	Seq. ID Nos.	Substrate Sequence	Seq. ID Nos.
10	CCCAGAG CUGAUGAG X CGAA IACGAGGG	825	CCCTCGTC T CTCTCGGG	1255
12	UGCCCGAG CUGAUGAG X CGAA IAGACGAG	826	CTCGTCTC T CTGCGGCA	1256
14	GUUGCCGC CUGAUGAG X CGAA IAGAGACG	827	C9TCTCTC T CGGGCAAC	1257
20	CGCCAGU CUGAUGAG X CGAA ICCCAGAG	828	TCTCGGGC A ACATGCGG	1258
23	GCCCGCCA CUGAUGAG X CGAA IUUGCCGC	829	CGGGCAAC A TGCGCGG	1259
49	CUCCCGGA CUGAUGAG X CGAA ICCGCUAC	830	GTAGCGGC C TCCGGGAG	1260
50	GCUCCCGG CUGAUGAG X CGAA ICGCGCUA	831	TAGCGGCC T CCGGAGC	1261
52	UGGCUCGC CUGAUGAG X CGAA IAGGCCGC	832	GCGGCCTC C GGGAGCCA	1262
59	AUUCAGGU CUGAUGAG X CGAA ICUCCGGC	833	CGGGGAGC C ACCTGAAT	1263
60	CAUUCAGG CUGAUGAG X CGAA ICGUCCCG	834	CGGAGGCC A CCTGAATG	1264
62	GCCAUUCA CUGAUGAG X CGAA IUGGCUCC	835	GGAGCCAC C TGAATGGC	1265
63	CGCCAUUC CUGAUGAG X CGAA IUGGCUCC	836	GAGCCACC T GAAATGGC	1266
74	UGGAUCCA CUGAUGAG X CGAA IUCGCUAU	837	ATGGCGAC C TGGATCCA	1267
75	CUGGAUCC CUGAUGAG X CGAA IUGGCGCA	838	TGGCGACC T GGATCCAG	1268
81	UGUGUUCU CUGAUGAG X CGAA IAUCCAGG	839	CCTGGATC C AGACGACA	1269
82	CUUGUGUC CUGAUGAG X CGAA IGAUCCAG	840	CTGGATCC A GACGACAG	1270
89	UUCUUCGC CUGAUGAG X CGAA IUCGUCUG	841	CAGAGGAC A GCGAAGAA	1271
103	GUAGAGGC CUGAUGAG X CGAA ICUCUUC	842	GAAGGAGC T GCCTCTAC	1272
106	GCGGUAGA CUGAUGAG X CGAA ICAGCUCC	843	GGAGCTGC C TCTACGGC	1273
107	AGCCGUAG CUGAUGAG X CGAA ICGAGCUC	844	GAGCTGCC T CTAAGGCT	1274
109	UCAGCCGU CUGAUGAG X CGAA IAGGACGC	845	GCTGCCTC T ACAGCTGA	1275
115	GCUCUUCU CUGAUGAG X CGAA ICCGUAGA	846	TCTACGGC T GAGGAAGC	1276
124	UUCUUGGC CUGAUGAG X CGAA ICUCUUC	847	GAGGAAGC A GCCAAGAA	1277
127	UUUUUCUU CUGAUGAG X CGAA ICUGCUUC	848	GAAGCAGC C AAGAAAAA	1278
128	UUUUUUUU CUGAUGAG X CGAA ICGUGCUU	849	AAGCAGCC A AGAAAAA	1279
158	AGGCCUUC CUGAUGAG X CGAA ICUCUUCU	850	AGAAGAGC A AAGGGCCT	1280
165	CUGCAGAA CUGAUGAG X CGAA ICCCUUUG	851	CAAAGGCC C TCTCGCAG	1281
166	CGUCGAGA CUGAUGAG X CGAA IGCCTUUU	852	AAAGGGCC T TCTGCAGC	1282
169	CCGUCGUC CUGAUGAG X CGAA IAAAGCCC	853	GGGCTCTC T GCAGCAGG	1283
172	UCCCGUCG CUGAUGAG X CGAA ICAGAAAG	854	CCTTCTGC A GCAGGGGA	1284
175	UGUUCCCC CUGAUGAG X CGAA ICUGCAGA	855	TCTGCAGC A GGGGAACA	1285
183	CAGGUUCC CUGAUGAG X CGAA IUUCCCUU	856	AGGGGAAC A GGAACCTG	1286
189	CUUUUAUC CUGAUGAG X CGAA IUUCCUGU	857	ACAGGAAC C TGATAAAG	1287
190	UCUUUAUC CUGAUGAG X CGAA IGUUCCUG	858	CAGGAACC T GATAAAGA	1288
202	GAGGUUCC CUGAUGAG X CGAA IAUUUUUU	859	AAAGAAAT A GGAGCCTC	1289
208	UCCACUGA CUGAUGAG X CGAA ICUCUUGA	860	TCAGGAGC C TCAGTGA	1290
209	AUCCACUG CUGAUGAG X CGAA ICGUCUUG	861	CAGGAGCC T CAGTGGAT	1291
211	UCAUCCAC CUGAUGAG X CGAA IAGGCUCC	862	GGAGCCTC A GTGGATGA	1292
226	AACUGUCU CUGAUGAG X CGAA ICUACUUC	863	GAAGTAGC A AGACAGTT	1293
231	UUUCCAAC CUGAUGAG X CGAA IUCUUGUC	864	AGCAAGAC A GTTGAAGA	1294
244	UCCAAUGC CUGAUGAG X CGAA IAUUUUUC	865	GAAAGATC A GCATTGGA	1295
247	UCUUCCAA CUGAUGAG X CGAA ICUGAUUC	866	AGATCAGC A TTGAAGA	1296

Table 10

307	UUUCCAGU	CUGAUGAG	X	CGAA	ICUCCAUC	867	GATGGAGC	A	ACTGGAAA	1297
310	UUCUUUCC	CUGAUGAG	X	CGAA	IUUGCUCC	868	GGAGCAAC	T	GGAAGAAA	1298
348	GAACUUUU	CUGAUGAG	X	CGAA	IUCCUCUC	869	GAGAGGAC	C	AAAAGTTC	1299
349	UGAACUUU	CUGAUGAG	X	CGAA	IGUCCUCU	870	AGAGGACC	A	AAAGTTCA	1300
357	GGUCUGUU	CUGAUGAG	X	CGAA	IAACUUUU	871	AAAGTTCC	A	AACAGACC	1301
361	GGAGGGUC	CUGAUGAG	X	CGAA	IUUUGAAC	872	GTTCAAAC	A	GACCCCTC	1302
365	UGAGGGAG	CUGAUGAG	X	CGAA	IUCUGUUU	873	AAACAGAC	C	CTCCCTCA	1303
366	CUGAGGGA	CUGAUGAG	X	CGAA	IGUCUGUU	874	AACAGACC	C	TCCTCTAG	1304
367	ACUGAGGG	CUGAUGAG	X	CGAA	IGGUCUGU	875	ACAGACCC	T	CCCTCAGT	1305
369	GAACUGAG	CUGAUGAG	X	CGAA	IAGGUGUC	876	AGACCCCTC	C	CTCAGTTC	1306
370	GGAACUGA	CUGAUGAG	X	CGAA	IGAGGGUC	877	GACCCCTCC	C	TCAGTTCC	1307
371	UGGAACUG	CUGAUGAG	X	CGAA	IGGAGGGU	878	ACCCCTCCC	T	CAGTTCCA	1308
373	AUUGGAAC	CUGAUGAG	X	CGAA	TAGGGAGG	879	CTCCCTCC	A	GTTCCAAT	1309
378	CACAUAUU	CUGAUGAG	X	CGAA	IAACUGAG	880	CTCAGTTC	C	AATATGTT	1310
379	UCACUAUU	CUGAUGAG	X	CGAA	IGAACUGA	881	TCAGTTCC	A	ATATGTGA	1311
389	AGGAUACA	CUGAUGAG	X	CGAA	IUCACUAU	882	TATGTGAC	C	TGTAACCT	1312
390	UAGGAUAC	CUGAUGAG	X	CGAA	IGUCACAU	883	ATGTGACC	T	GTATCCTA	1313
396	CACCAUUA	CUGAUGAG	X	CGAA	IAUACAGG	884	CTGTATTC	C	TATGTGTT	1314
397	ACACCAUU	CUGAUGAG	X	CGAA	IGAUAACG	885	CTGTATTC	T	ATGTGTTT	1315
411	GUCCUUUG	CUGAUGAG	X	CGAA	IAAAUACA	886	TGATTTTC	C	CAAGGGAC	1316
412	UGUCCUUU	CUGAUGAG	X	CGAA	IGAAAUAU	887	GTATTTTC	C	AAAGGACA	1317
413	IUGUCCUU	CUGAUGAG	X	CGAA	IGGAAUAU	888	TATTTCCC	A	AAGGACAA	1318
420	CGCAUUCU	CUGAUGAG	X	CGAA	IUCCUUGG	889	CAAGAGAC	A	AGAATGGC	1319
434	UGUGGGUG	CUGAUGAG	X	CGAA	IUAUUCGC	890	GCGAATAC	C	CACCCACA	1320
435	GUGUGGGU	CUGAUGAG	X	CGAA	IGUAUUCG	891	CGAATACC	C	ACCCACAC	1321
436	UGUGUGGG	CUGAUGAG	X	CGAA	IGGUAUUC	892	GAATACCC	A	CCCACACA	1322
438	CUUGUGUG	CUGAUGAG	X	CGAA	IUGGGUAU	893	ATACCCAC	C	CACACAAG	1323
439	UCUUGUGU	CUGAUGAG	X	CGAA	IUGGGUAU	894	TACCCACC	C	ACACAAGA	1324
440	AUCUUGUG	CUGAUGAG	X	CGAA	IGGUGGGU	895	ACCCACCC	A	CACAAGAT	1325
442	CCAUCUUG	CUGAUGAG	X	CGAA	IUGGGUGG	896	CCACCCAC	A	CAAGATGG	1326
444	GCCCAUCU	CUGAUGAG	X	CGAA	IUGGGUGG	897	ACCCACAC	A	AGATGGGC	1327
457	CAAGCAGC	CUGAUGAG	X	CGAA	IUUCGCCC	898	GGCGCAAC	A	GCTGCTTG	1328
460	CUCCAAGC	CUGAUGAG	X	CGAA	ICUUGUUG	899	GGAACAGC	T	GCTTGGAG	1329
463	GUUCUCCA	CUGAUGAG	X	CGAA	ICAGCUGU	900	ACAGCTGC	T	TGGAGAAC	1330
472	UCACUUGU	CUGAUGAG	X	CGAA	IUUCUCCA	901	TGGAGAAC	T	ACAAGTGA	1331
475	UCUUCACU	CUGAUGAG	X	CGAA	IUAUUUCU	902	AGAACTAC	A	AGTGAAGA	1332
493	UGAUCUAA	CUGAUGAG	X	CGAA	ICUUUCUU	903	AAGAAAGC	A	TTAGATCA	1333
501	CACUUGCC	CUGAUGAG	X	CGAA	IAUCUAAU	904	ATTAGATC	A	GGCAAGTG	1334
505	UCUUCACU	CUGAUGAG	X	CGAA	ICCUUAGC	905	GATCAGGC	A	AGTGAAGA	1335
538	GUUCUUGC	CUGAUGAG	X	CGAA	ICUUCUUG	906	CGAGAAGC	T	GCAGAAGC	1336
541	IUGUCUUC	CUGAUGAG	X	CGAA	ICAGCUUC	907	GAAGCTGC	A	GAAACACA	1337
547	UGUCGAUG	CUGAUGAG	X	CGAA	ICUUCUUC	908	GCAGAAGC	A	CATCGACA	1338
549	CUUGUCGA	CUGAUGAG	X	CGAA	IUGCUUCU	909	AGAAAGAC	A	TCGACAAG	1339
555	IUCUUAAC	CUGAUGAG	X	CGAA	IUCGAUGU	910	ACATCGAC	A	AGTTAGAA	1340
578	CUUGAUCC	CUGAUGAG	X	CGAA	ICUCAUUA	911	TAAATGAG	T	GGATCAAG	1341
584	CCCAGGCU	CUGAUGAG	X	CGAA	IAUCCAGC	912	GCTGGATC	A	AGCCTGGG	1342
588	UCAUCCCA	CUGAUGAG	X	CGAA	ICUUGAUC	913	GATCAAGC	C	TGGGATGA	1343

Table 10

589	GUCAUCC	CUGAUGAG	X	CGAA	IGCUUGAU	914	ATCANGCC	T	GGGATGAC	1344
598	UCUAUCAU	CUGAUGAG	X	CGAA	IUCAUCCC	915	GGGATGAC	A	ATGATAGA	1345
611	CUUUUAC	CUGAUGAG	X	CGAA	IAUUUUA	916	TGAAATC	T	GTGAAAAG	1346
629	GCGUGAAC	CUGAUGAG	X	CGAA	IUCUCCA	917	TGGAAGAC	T	GTTCAGGC	1347
634	AACUUGCG	CUGAUGAG	X	CGAA	IAACAGUC	918	GACTGTTC	A	CGCAAGTT	1348
638	UAUUAACU	CUGAUGAG	X	CGAA	ICGUGAAC	919	GTTCACGC	A	AGTAAATA	1349
667	GCCAGGCC	CUGAUGAG	X	CGAA	ICAUUUA	920	TTAAATGC	A	GGCTTGGC	1350
671	AAAUGCCA	CUGAUGAG	X	CGAA	ICCUUGAU	921	ATGCAGGC	C	TGGCATT	1351
672	GAAUUGCC	CUGAUGAG	X	CGAA	IGCCUGCA	922	TGCAGGCC	T	GGCATTTC	1352
676	GUAGGAAA	CUGAUGAG	X	CGAA	ICCAAGCC	923	GGCTTGGC	A	TTTCTTAC	1353
681	AUCCAGUA	CUGAUGAG	X	CGAA	IAAAUGCC	924	GGCATTTC	C	TACTGGAT	1354
682	CAUCCAGU	CUGAUGAG	X	CGAA	IGAAUUGC	925	GCATTTC	T	ACTGGATG	1355
685	GAACAUC	CUGAUGAG	X	CGAA	IUAGGAAA	926	TTTCTTAC	T	GGATGTTT	1356
694	UAUUGAG	CUGAUGAG	X	CGAA	IAACAUC	927	GGATGTTT	C	CTCAATAA	1357
696	AAUUAUG	CUGAUGAG	X	CGAA	IAGAACA	928	ATGTCTTC	T	CAATAATT	1358
698	ACAAUAU	CUGAUGAG	X	CGAA	IAGAGAAC	929	GTTCCTTC	A	ATAATGTT	1359
709	UAUUGGC	CUGAUGAG	X	CGAA	ICACAAU	930	AATTGTGC	T	GCCATTA	1360
712	GUAAUAG	CUGAUGAG	X	CGAA	ICAGCACA	931	TGCTGTGC	C	CATTATAC	1361
713	AGUAUAU	CUGAUGAG	X	CGAA	IGCAGCAC	932	GTCTGTGC	C	ATTACTAT	1362
714	GAGUAUA	CUGAUGAG	X	CGAA	IGGCAGCA	933	TGCTGTGC	A	TTATCTTC	1363
721	GCAUUGG	CUGAUGAG	X	CGAA	IUAUAUG	934	CATTATAC	T	CCCAATGC	1364
723	CGGCAUUG	CUGAUGAG	X	CGAA	IAGUAUA	935	TTATCTTC	C	CAATGCCG	1365
724	CCGCAUUG	CUGAUGAG	X	CGAA	IGAGUAUA	936	TATCTTCC	C	AATGCCGG	1366
725	ACCGCAU	CUGAUGAG	X	CGAA	IGGAGUAU	937	ATCTCTCC	A	ATGCCGGT	1367
730	GUGUAC	CUGAUGAG	X	CGAA	ICAUUGG	938	CCCAATGC	C	GGTGACAC	1368
737	UACUGUUG	CUGAUGAG	X	CGAA	IUCACCG	939	CGGTGAC	A	CAACAGTA	1369
739	AAUACUGU	CUGAUGAG	X	CGAA	IUGUAC	940	GGTGACAC	A	ACAGTATT	1370
742	UGUAUAC	CUGAUGAG	X	CGAA	IUGUGUC	941	GACACAC	A	GTATTACA	1371
750	CAUCAUAC	CUGAUGAG	X	CGAA	IUAUAUCU	942	AGTATTAC	A	GTATGATG	1372
761	UUUACAGA	CUGAUGAG	X	CGAA	IUCAUATU	943	ATGATGAC	A	TCTGTAATA	1373
764	UAUUUAC	CUGAUGAG	X	CGAA	IAUGUCAU	944	ATGACATC	T	GTAAATAA	1374
776	UGUUCCA	CUGAUGAG	X	CGAA	IUCUAUUG	945	AAATAGAC	T	TTGGAACA	1375
784	CUUAUUG	CUGAUGAG	X	CGAA	IUCCAATA	946	TTTGAAC	A	CATATAAG	1376
786	CAUUAUA	CUGAUGAG	X	CGAA	IUGUCCA	947	TGGAACAC	A	TATAGGTG	1377
809	AAAGCAC	CUGAUGAG	X	CGAA	IUCAUUA	948	TATATGAC	T	GTGCTTTT	1378
814	ACAGUAAA	CUGAUGAG	X	CGAA	ICACAGUC	949	GACTGTGC	T	TTTACTGT	1379
820	AAAGUGAC	CUGAUGAG	X	CGAA	IUAAAAAC	950	GCTTTTAC	T	GTCATTTT	1380
824	AUUAUAA	CUGAUGAG	X	CGAA	IACAGUAA	951	TACTGTGC	A	CTTTTAAT	1381
826	GGAUUA	CUGAUGAG	X	CGAA	IUGACAGU	952	ACTGTGTC	T	TTTATCC	1382
834	CAUAUUG	CUGAUGAG	X	CGAA	IAUUAUAA	953	TTTTAATC	C	CAATATG	1383
835	UCAUAUUG	CUGAUGAG	X	CGAA	IGAUUAU	954	TTTATCC	C	AAATATGA	1384
836	AUCAUAUUG	CUGAUGAG	X	CGAA	IGGAUUA	955	TTAATCCC	A	AATATGAT	1385
859	UCUUUAC	CUGAUGAG	X	CGAA	ICUUUUA	956	TTAAAGC	T	GTAAAGA	1386
871	GUGUUGU	CUGAUGAG	X	CGAA	ICAUUUU	957	AAAGATGC	T	ACTAACAC	1387
874	CCAGUGUUG	CUGAUGAG	X	CGAA	IUAGCAUC	958	GATGCTAC	T	AACACTGG	1388
878	UAUCCAG	CUGAUGAG	X	CGAA	IUAUGUAG	959	CTACTAAC	A	CTGGAATA	1389
880	UUUAUCC	CUGAUGAG	X	CGAA	IUGUUGU	960	ACTAACAC	T	GGAATAAA	1390

Table 10

895	UCAAUUC	CUGAUGAG	X	CGAA	ICACACUU	961	ANGTGTGC	T	GGAATTGA	1391
912	CAUCACAC	CUGAUGAG	X	CGAA	IACGAACA	962	TGTTCTGC	T	GTGTGATG	1392
931	UCUUGGAU	CUGAUGAG	X	CGAA	ICCUACAC	963	GTGTGGGC	C	ATCCAAGA	1393
932	UUCUGGA	CUGAUGAG	X	CGAA	IGCCUCC	964	GTGTGGCC	A	TCCAAGAA	1394
935	AACUUCU	CUGAUGAG	X	CGAA	IAGGCCU	965	AGGCCATC	C	AAGAAGTT	1395
936	UACUUCU	CUGAUGAG	X	CGAA	IGAUGGC	966	GCBCATTC	A	AGAAGTTA	1396
952	ACUUCUA	CUGAUGAG	X	CGAA	IACUCCAU	967	ATGGAGTC	C	TATGAATT	1397
953	AACUUCU	CUGAUGAG	X	CGAA	IGACUCCA	968	TGGAGTCC	T	ATGAAGTT	1398
979	ACUUGUA	CUGAUGAG	X	CGAA	IUCUCCCC	969	GGGAAGAC	A	TATCAAGT	1399
984	GUUUCACU	CUGAUGAG	X	CGAA	IAUAUGUC	970	GACATATC	A	AGTGAAC	1400
993	UACGGAU	CUGAUGAG	X	CGAA	IUUUCACU	971	AGTGAAC	C	AATCCGTA	1401
994	UACGGAU	CUGAUGAG	X	CGAA	IUUUCACU	972	GTGAAC	A	ATCCGTAA	1402
998	UAGAUUAC	CUGAUGAG	X	CGAA	IAUUGUUC	973	AACCAATC	C	GTAATCTA	1403
1005	GUCCAUU	CUGAUGAG	X	CGAA	IAUUAACG	974	CCGTAATC	T	AAATGGAC	1404
1024	CAAUUGAA	CUGAUGAG	X	CGAA	IUCCAUIU	975	AAATGGAC	A	TTCAATTG	1405
1018	UGCCCAU	CUGAUGAG	X	CGAA	IAAUGUCC	976	GGACATTC	A	ATTGGGCA	1406
1026	UUCUAU	CUGAUGAG	X	CGAA	ICCCAAU	977	AATTTGGC	A	ATATAGAA	1407
1038	UUCGAGCA	CUGAUGAG	X	CGAA	IUAUUCUA	978	TAGAATGC	A	TGCTGGAA	1408
1042	GUUUUCC	CUGAUGAG	X	CGAA	ICAUUUAU	979	ATACATGC	T	GGAAAAAC	1409
1051	AUCGGCAC	CUGAUGAG	X	CGAA	IUUUUUCC	980	GGAAAAAC	A	GTGCCGAT	1410
1056	UCACAUC	CUGAUGAG	X	CGAA	ICACUGU	981	AACAGTGC	C	GATTGTGA	1411
1078	AUUCUGU	CUGAUGAG	X	CGAA	ICCUCCCC	982	GGGAGGCC	A	ACAGAATG	1412
1081	UCCAUUCU	CUGAUGAG	X	CGAA	IUGGCCUC	983	GAGGCAAC	A	AGATGGA	1413
1108	GUUUCAU	CUGAUGAG	X	CGAA	ICAUUAC	984	GTATATGC	A	ATTGAAC	1414
1117	CUACCAA	CUGAUGAG	X	CGAA	IUUUCAU	985	ATTGAAC	C	TTTGTAGT	1415
1118	ACUACCAA	CUGAUGAG	X	CGAA	IUUUCAA	986	TTGAAC	T	TTGTAGT	1416
1129	CCUUUCC	CUGAUGAG	X	CGAA	IUAUAC	987	GGTATGAC	A	GGAAAAAG	1417
1146	UAUCAUA	CUGAUGAG	X	CGAA	IAACAACA	988	TGTTGTTC	A	TGATGATA	1418
1165	AUGUAUG	CUGAUGAG	X	CGAA	IAACAUC	989	AAGTGTTC	A	CATTACAT	1419
1167	UCAUGUA	CUGAUGAG	X	CGAA	IUGAACAU	990	ATGTTTAC	A	TTACATGA	1420
1172	AUUUUUA	CUGAUGAG	X	CGAA	IUAUUGU	991	CACATTAC	A	TGAAAAAT	1421
1194	UUGGCACA	CUGAUGAG	X	CGAA	IUCCAACA	992	TGTTGGAC	A	TGTGCCAA	1422
1200	GCCUUAU	CUGAUGAG	X	CGAA	ICACAUU	993	ACATGTGC	C	AATAAGGC	1423
1201	AGCCUUAU	CUGAUGAG	X	CGAA	IGCACAU	994	CATGTGCC	A	ATAAGGCT	1424
1209	UUCUUGA	CUGAUGAG	X	CGAA	ICCUUAU	995	AATAAGGC	T	TCCAAGAA	1425
1212	UUGUUCU	CUGAUGAG	X	CGAA	IAAGCCU	996	AAGGCTTC	C	AAGAACAA	1426
1213	UUUGUUCU	CUGAUGAG	X	CGAA	IGAAGCCU	997	AGGCTTCC	A	AGAACAAA	1427
1219	AAGUGUU	CUGAUGAG	X	CGAA	IUCUUGU	998	CCAAGAAC	A	AAACACTT	1428
1224	UUAACAAG	CUGAUGAG	X	CGAA	IUUUGUU	999	AACAACAA	A	CTTGTAA	1429
1226	AUUURACA	CUGAUGAG	X	CGAA	IUGUUUG	1000	CAAAACAC	T	TGTTAAAT	1430
1238	UUAUUGA	CUGAUGAG	X	CGAA	IACAUAU	1001	TAAATGTC	A	TCAATGAA	1431
1241	GUUUCAU	CUGAUGAG	X	CGAA	IAUGACA	1002	ATGTCTAC	A	ATGAACAA	1432
1250	GGUCCAA	CUGAUGAG	X	CGAA	IUUUUAU	1003	ATGAAC	T	TTGAAACC	1433
1258	AAGGCAAG	CUGAUGAG	X	CGAA	IUUCCAA	1004	TTTGAAC	C	CTTGCTTT	1434
1259	GAAGGCAA	CUGAUGAG	X	CGAA	IUGUCCAA	1005	TTGGAACC	C	TTGCTTTC	1435
1260	AGAAGGCA	CUGAUGAG	X	CGAA	IGGUCCA	1006	TGGAGCCC	T	TGCTTCT	1436
1264	CGCGAGAA	CUGAUGAG	X	CGAA	ICAGGCU	1007	ACCTTGC	C	TCTTCCG	1437

Table 10

1265	GCGGCAGA	CUGAUGAG	X	CGAA	IGCAAGGG	1008	CCCTTGCC	T	TCTGCCGC	1438
1268	UCUGCGGC	CUGAUGAG	X	CGAA	IAAGGCAA	1009	TTGCTTC	T	GCCGACAG	1439
1271	CCAUCUGC	CUGAUGAG	X	CGAA	ICAGAAAG	1010	CCTCTGTC	C	GCAGATGG	1440
1274	CAGCCAU	CUGAUGAG	X	CGAA	ICGGCAGA	1011	TCTGCCGC	A	GATGGCTG	1441
1281	AGCGAUCC	CUGAUGAG	X	CGAA	ICCAUCUG	1012	CAGATGGC	T	GGATCGCT	1442
1289	UUCUCCCA	CUGAUGAG	X	CGAA	ICGAUCCA	1013	TGGATGCT	T	TGGAGGAA	1443
1307	AGCCAUCA	CUGAUGAG	X	CGAA	IUAUUUAC	1014	GTAATAC	T	TGATGGCT	1444
1315	UUCUCUAG	CUGAUGAG	X	CGAA	ICCAUCAA	1015	TTGATGGC	T	CTGAAGAA	1445
1317	GAUUCUUC	CUGAUGAG	X	CGAA	IAGGCAUC	1016	GATGGCTC	T	GAAGAATC	1446
1326	AGUCACAC	CUGAUGAG	X	CGAA	IAUUCUUC	1017	GAAGAATC	T	GTGTGACT	1447
1334	AAUGCCCA	CUGAUGAG	X	CGAA	IUCACACA	1018	TGTGTGAC	T	TGGGCATT	1448
1340	AUCUACAA	CUGAUGAG	X	CGAA	ICCCAAGU	1019	ACTTGGGC	A	TGTAGAT	1449
1350	GUGGAUUA	CUGAUGAG	X	CGAA	IAUCUACA	1020	TGTAGATC	C	ATATCCAC	1450
1351	GGUGGAUA	CUGAUGAG	X	CGAA	IGAUCUAC	1021	GTAGATCC	A	TATCCACC	1451
1356	AUAUUGGU	CUGAUGAG	X	CGAA	IAUAUGGA	1022	TCCATATC	C	ACCATTAT	1452
1357	CAUAUUGG	CUGAUGAG	X	CGAA	IGAUAUGG	1023	CCATATCC	A	CCATTATG	1453
1359	CACAUAAU	CUGAUGAG	X	CGAA	TUGGAUUA	1024	ATATCCAC	C	ATTATGTG	1454
1360	UCACAUAA	CUGAUGAG	X	CGAA	IGUGGAUA	1025	TATCCACC	A	TTATGTGA	1455
1370	UCCUUAUA	CUGAUGAG	X	CGAA	IUCACUAA	1026	TATGTGAC	A	TTAAAGGA	1456
1381	GCUGUAUA	CUGAUGAG	X	CGAA	IAUCCUUU	1027	AAAGGATC	A	TATACAGC	1457
1387	AAUUGGCG	CUGAUGAG	X	CGAA	IUAUAUGA	1028	TCATATAC	A	GGCGMATT	1458
1392	GUCAAAUJ	CUGAUGAG	X	CGAA	ICGUGUA	1029	TACAGGCG	A	ATTGTGAC	1459
1401	GGAUUGUA	CUGAUGAG	X	CGAA	IUUCAAAU	1030	ATTGGAAC	A	TACCATCC	1460
1405	AACAGGAA	CUGAUGAG	X	CGAA	IUAUGUUC	1031	GAACATAC	C	ATCCTGTT	1461
1406	CAACAGGA	CUGAUGAG	X	CGAA	IGUAUGUU	1032	AACATACC	A	TCCTGTG	1462
1409	ACGCAACA	CUGAUGAG	X	CGAA	IAUGGUUA	1033	ATACCATC	C	TGTTGCGT	1463
1410	GACGCAAC	CUGAUGAG	X	CGAA	IGAUGGUA	1034	TACCATCC	T	GTTCGGTC	1464
1419	UACAUGUU	CUGAUGAG	X	CGAA	IACGCAAC	1035	GTTGCGTC	C	AACATGTA	1465
1420	IUAUAUGU	CUGAUGAG	X	CGAA	IGACGCAA	1036	TGCGCTCC	A	ACATGTAA	1466
1423	UCUUAACA	CUGAUGAG	X	CGAA	IUUGGACG	1037	CGTCCAAC	A	TGTAAGA	1467
1439	UCCUCUGC	CUGAUGAG	X	CGAA	IACAACTU	1038	AAGTTGTC	A	GCAGAGGA	1468
1442	AUUCUCCU	CUGAUGAG	X	CGAA	ICUGACAA	1039	TGTGACG	A	GAGGAGAT	1469
1454	AQUUAUAJ	CUGAUGAG	X	CGAA	IUCAUCUC	1040	GAGATGAC	T	TTTAAACT	1470
1462	IUGGACUA	CUGAUGAG	X	CGAA	IUUUAUAU	1041	TATTAAAC	T	TAGTCCAA	1471
1468	GUGGCUUU	CUGAUGAG	X	CGAA	IACUAAAU	1042	ACTTAGTC	C	AAAGCCAC	1472
1469	GGUGGCUU	CUGAUGAG	X	CGAA	IGACUAAU	1043	CTTAGTCC	A	AAAGCCAC	1473
1474	GUUGGAGU	CUGAUGAG	X	CGAA	ICUUUGGA	1044	TCCAAGCC	C	ACCTCAAC	1474
1475	UGUUGAGG	CUGAUGAG	X	CGAA	IGCUUUGG	1045	CCAAAGCC	A	CCTCAACA	1475
1477	GGUGUUGA	CUGAUGAG	X	CGAA	IUGGCUUU	1046	AAAGCCAC	C	TCAACACC	1476
1478	AGGUUGUG	CUGAUGAG	X	CGAA	IGUGGCUU	1047	AAGCCACC	T	CAACACCT	1477
1480	AAAGGUGU	CUGAUGAG	X	CGAA	IAGUGGCG	1048	GCCACCTC	A	ACACCTTT	1478
1483	AAUUAAGG	CUGAUGAG	X	CGAA	IUGGAGGU	1049	ACCTCAAC	A	CCTTTATT	1479
1485	AAAAUAAA	CUGAUGAG	X	CGAA	IUGUUGAG	1050	CTCAACAC	C	TTTATTTT	1480
1486	GAUUUAUA	CUGAUGAG	X	CGAA	IGUGUUGA	1051	TCAACACC	T	TTATTTTC	1481
1495	CAAGGCUU	CUGAUGAG	X	CGAA	IAAAUUAU	1052	TTATTTTC	T	GAGCTTTG	1482
1500	UCCAACAA	CUGAUGAG	X	CGAA	ICUCAGAA	1053	TTCGAGC	T	TGTTTGGA	1483
1513	UGGUUAUA	CUGAUGAG	X	CGAA	IUUUUAUA	1054	TGAAAAAC	A	TGATACCA	1484

Table 10

1520	UUAUUUCU	CUGAUGAG	X	CGAA	IUAUCAUG	1055	CATGATAC	C	AGAATTAA	1485
1521	AUUAUUUC	CUGAUGAG	X	CGAA	IGUAUCAU	1056	ATGATACC	A	GAATTAAT	1486
1534	CAACAUGU	CUGAUGAG	X	CGAA	ICAAAUUA	1057	TAATTGGC	C	ACATGTTG	1487
1535	ACAACAUG	CUGAUGAG	X	CGAA	IGCAAAUU	1058	AATTGGCC	A	CATGTTGT	1488
1537	AGACAACA	CUGAUGAG	X	CGAA	IUGGCAAA	1059	TTTGCCAC	A	TGTTGTCT	1489
1545	GUUAAAC	CUGAUGAG	X	CGAA	TACAAACU	1060	ATGTTGTC	T	GTTTAAAC	1490
1554	GGUCCAC	CUGAUGAG	X	CGAA	IUUAAAAC	1061	GTTTAAAC	A	GTGACCC	1491
1561	AUUACAUG	CUGAUGAG	X	CGAA	IUCCACUG	1062	CAGTGGAC	C	CATGTAAT	1492
1562	UAUUAACU	CUGAUGAG	X	CGAA	IGUCCACU	1063	AGTGGACC	C	ATGTAATA	1493
1563	GUUAUACA	CUGAUGAG	X	CGAA	IGGUCCAC	1064	GTGGACCC	A	TGTAATAC	1494
1572	UGGAUAAA	CUGAUGAG	X	CGAA	IUAUUAACA	1065	TGTAATAC	T	TTTATCCA	1495
1579	UUAUAAACU	CUGAUGAG	X	CGAA	IUAUAAAG	1066	CTTTATAC	C	ATGTTTAA	1496
1580	UUUAAACA	CUGAUGAG	X	CGAA	IGAUAAAA	1067	TTTTATCC	A	TGTTTAAA	1497
1606	UUUGCCUU	CUGAUGAG	X	CGAA	IUCCAAAU	1068	ATTTGGAC	A	AAGGCAAA	1498
1612	AGACGGUU	CUGAUGAG	X	CGAA	ICCUUUUU	1069	ACAAAGGC	A	AACCGTCT	1499
1616	CAUAGAC	CUGAUGAG	X	CGAA	IUUUGCCU	1070	AGGCAAAC	C	GTCATAAT	1500
1620	AUUACAUU	CUGAUGAG	X	CGAA	IACGGUUU	1071	AAACCGTC	T	AATGTAAT	1501
1633	UUUUCGUU	CUGAUGAG	X	CGAA	IUUAAUUA	1072	TAATTAAC	C	AACGAAAA	1502
1634	UUUUUCGU	CUGAUGAG	X	CGAA	IGUUAAUU	1073	AATTAACC	A	ACGAAAAA	1503
1645	GUCCGGAA	CUGAUGAG	X	CGAA	ICUUUUUC	1074	GAUAAAGC	T	TTCCGGAC	1504
1649	AAAGGUCC	CUGAUGAG	X	CGAA	IAAAGCUU	1075	AGCTTTTC	C	GGACTTTT	1505
1654	CAUUUAAA	CUGAUGAG	X	CGAA	IUCCGGAA	1076	TTCCGGAC	T	TTTAAATG	1506
1664	AAACAGUU	CUGAUGAG	X	CGAA	ICAUUUUA	1077	TTAAATGC	T	AACGTGTT	1507
1668	GGAAAAAC	CUGAUGAG	X	CGAA	IUUAGCAU	1078	ATGCTAAC	T	GTTTTTCC	1508
1676	CAGGAAGG	CUGAUGAG	X	CGAA	IAAAAACA	1079	TGTTTTTC	C	CCITCCTG	1509
1677	ACAGGAAG	CUGAUGAG	X	CGAA	IGAAAAAC	1080	GTTTTTCC	C	CTTCCTGT	1510
1678	GACAGGAA	CUGAUGAG	X	CGAA	IGGAAAAA	1081	TTTTTCCC	C	TTCTGTCT	1511
1679	AGACAGGA	CUGAUGAG	X	CGAA	IGGGAAAA	1082	TTTTCCCC	T	TCCTGTCT	1512
1682	CCUAGACA	CUGAUGAG	X	CGAA	TAAAGGGA	1083	TCCTCTTC	C	TGCTAGG	1513
1683	UCCUAGAC	CUGAUGAG	X	CGAA	IGAAGGGG	1084	CCCCTTCC	T	GTCTAGGA	1514
1687	AUUUUUCU	CUGAUGAG	X	CGAA	IACAGGAA	1085	TTCTGTCT	T	AGGAAAAA	1515
1698	AGCUUUUU	CUGAUGAG	X	CGAA	ICAUUUUC	1086	GAUAAATC	T	ATAAGCTT	1516
1706	CUAAUUUG	CUGAUGAG	X	CGAA	ICUUUAUA	1087	TAAATAGC	T	CAATATTAG	1517
1708	AACUAAUU	CUGAUGAG	X	CGAA	IAGCUUUA	1088	TAAAGCTC	A	AATTAGTT	1518
1726	AACGUUAU	CUGAUGAG	X	CGAA	IUCAUUCC	1089	GAATATAC	T	TATACGTT	1519
1748	AUCUCUUA	CUGAUGAG	X	CGAA	IUAUUAUA	1090	TTGAATAC	C	TAGAGAT	1520
1749	UAUCUCUU	CUGAUGAG	X	CGAA	IGUAUUAU	1091	TGAATACC	T	AAGAGATA	1521
1759	AUCCAAAA	CUGAUGAG	X	CGAA	IUAUCUCU	1092	AGAGATAC	T	TTTTGGAT	1522
1779	AAGAUAUU	CUGAUGAG	X	CGAA	ICAAUUAU	1093	ATATTGTC	C	ATATTCTT	1523
1780	UAAGAAUA	CUGAUGAG	X	CGAA	IGCAAUAU	1094	ATATTGCC	A	TATCTTTA	1524
1786	UUCAAGUA	CUGAUGAG	X	CGAA	IAUAUUGG	1095	CCATATTCT	T	TACTTGAA	1525
1791	AGCAUUUA	CUGAUGAG	X	CGAA	IUAAGAAU	1096	ATCTTATC	T	TGATGAT	1526
1798	UCAUUAUA	CUGAUGAG	X	CGAA	ICAUUUAU	1097	TTGAATGC	T	TTGAATGA	1527
1808	CUGGAUUG	CUGAUGAG	X	CGAA	IUCAUUAU	1098	TGAATATC	T	ACATCCAG	1528
1811	GAACUGGA	CUGAUGAG	X	CGAA	IUAUGUUA	1099	ATGATAC	A	TCAGTTTC	1529
1814	GCAGAAUC	CUGAUGAG	X	CGAA	IAUGUAUG	1100	ACTACATC	C	AGTCTGTC	1530
1815	UGCAGAAC	CUGAUGAG	X	CGAA	IGAUGUAG	1101	CTACATCC	A	GTCTGCA	1531

Table 10

1820	AUAGGUGC	CUGAUGAG	X	CGAA	IAACUGGA	1102	TCCAGTTC	T	GCACCTAT	1532
1823	GGUAUAGG	CUGAUGAG	X	CGAA	ICAGAACU	1103	AGTTCTGC	A	CCTATACC	1533
1825	AGGUAUA	CUGAUGAG	X	CGAA	IUGCAGAA	1104	TTCTGCAC	C	TATACCTC	1534
1826	GAGGUAU	CUGAUGAG	X	CGAA	IUGCAGAA	1105	TCGACACC	T	ATACCTTC	1535
1831	CACCAGAG	CUGAUGAG	X	CGAA	IUAUAGGU	1106	ACCTATAC	C	CTCTGGTG	1536
1832	ACACCAGA	CUGAUGAG	X	CGAA	IUAUAGGU	1107	CCATATAC	C	TCTGGTGT	1537
1833	AACACCAG	CUGAUGAG	X	CGAA	IUGUAUAG	1108	CTATACCC	T	CTGGTGT	1538
1835	GCAACACC	CUGAUGAG	X	CGAA	IAGGUAU	1109	ATACCTTC	T	GGTGTTC	1539
1844	GGUAAAA	CUGAUGAG	X	CGAA	ICAAACACC	1110	GGTGTTC	T	TTTTAAC	1540
1852	UCCAGGAA	CUGAUGAG	X	CGAA	IUAUAAAA	1111	TTTTTAAC	C	TTCTCGGA	1541
1853	UCCAGGAA	CUGAUGAG	X	CGAA	IUAUAAAA	1112	TTTTTAAC	T	TCCTGGAA	1542
1856	GGAUUCCA	CUGAUGAG	X	CGAA	IAAGGUUA	1113	TAACCTTC	C	TGGAATCC	1543
1857	UGGAUCC	CUGAUGAG	X	CGAA	IUAAGGUU	1114	AACCTTC	T	GGAATCCA	1544
1864	UAGAAAA	CUGAUGAG	X	CGAA	IUAUCCAG	1115	CTGGAATC	C	ATTTCTA	1545
1865	UAGAAAA	CUGAUGAG	X	CGAA	IUAUCCAG	1116	TGGAATTC	A	TTTTCTAA	1546
1871	UAUUUUU	CUGAUGAG	X	CGAA	IAAAAUUG	1117	CCATTTTC	T	AAAAATA	1547
1885	GAAAGAU	CUGAUGAG	X	CGAA	IUCUUUAU	1118	ATAAGAC	A	CATTTCT	1548
1887	GAGAAGAA	CUGAUGAG	X	CGAA	IUGUCUUU	1119	AAAGACAC	A	TTCTCTC	1549
1891	UGCUGAGA	CUGAUGAG	X	CGAA	IAUUGUGU	1120	ACACATTC	T	TCTCAGCA	1550
1894	UGGUGCUG	CUGAUGAG	X	CGAA	IAAGAAUG	1121	CATTTCTC	T	CAGCAGCA	1551
1896	UGGUGGC	CUGAUGAG	X	CGAA	IAGAAGAA	1122	TTCTCTC	A	GCACCACA	1552
1899	UUGUGGC	CUGAUGAG	X	CGAA	IUGAGAA	1123	TTCTCAGC	A	CCACACAA	1553
1901	UGUGUGU	CUGAUGAG	X	CGAA	IUGCUGAG	1124	CTCAGCAC	C	ACACACAA	1554
1902	UGUGUGU	CUGAUGAG	X	CGAA	IUGCUGAG	1125	TCAGCAC	A	CAACACAA	1555
1904	AGGUGUG	CUGAUGAG	X	CGAA	IUGGUGU	1126	AGCACAC	A	CAACACCT	1556
1906	AUAGGUGU	CUGAUGAG	X	CGAA	IUGGUGU	1127	CACACAC	A	ACACCTAT	1557
1909	GGAAUAGG	CUGAUGAG	X	CGAA	IUGGUGU	1128	CACACAC	A	CCTATTC	1558
1911	UUGAAUA	CUGAUGAG	X	CGAA	IUGGUGU	1129	CACACAC	C	TATTC	1559
1912	UUUGAAU	CUGAUGAG	X	CGAA	IUGGUGU	1130	ACAACAC	T	ATTCCAA	1560
1917	UCGAUUU	CUGAUGAG	X	CGAA	IUAUAGGU	1131	ACCTATTC	C	AAATCGA	1561
1918	GUCAUUU	CUGAUGAG	X	CGAA	IUAUAGGU	1132	CCATTTTC	A	AAATCGA	1562
1927	AAUAUUGU	CUGAUGAG	X	CGAA	IUGCAUUU	1133	AAATCGAC	C	ACATATTT	1563
1928	CAAAUUG	CUGAUGAG	X	CGAA	IUGCAUUU	1134	AATCGAC	A	CATMTTG	1564
1930	UCCAAUA	CUGAUGAG	X	CGAA	IUGGUGA	1135	TCGACAC	A	TATTTGA	1565
1947	CUGAGGAG	CUGAUGAG	X	CGAA	IUCUUUACU	1136	AGTAAGC	T	CTCTCAG	1566
1949	UGCUGAGG	CUGAUGAG	X	CGAA	IAGCUUUA	1137	TAAGGCTC	T	CCTCAGCA	1567
1951	UUUGCUGA	CUGAUGAG	X	CGAA	IAGAGCUU	1138	AAGCTCTC	C	TCGACAA	1568
1952	AUUUGCUG	CUGAUGAG	X	CGAA	IAGAGCUU	1139	AGCTCTCC	T	CAGCAAT	1569
1954	ACAUUUGC	CUGAUGAG	X	CGAA	IAGGAGAG	1140	CTCTCTC	A	GCAATGT	1570
1957	UUUACAUU	CUGAUGAG	X	CGAA	IUGGAGGA	1141	TCCTCAGC	A	AATGATA	1571
1971	AUAUUUC	CUGAUGAG	X	CGAA	IUCUUUUU	1142	AAAGAAC	A	GAATTTAT	1572
1983	AGACAGUU	CUGAUGAG	X	CGAA	IUAUUAU	1143	ATTATAAC	A	AACTGTCT	1573
1987	UGAGAGAC	CUGAUGAG	X	CGAA	IUUUGUUA	1144	TAACAAAC	T	GTCTCTCA	1574
1991	GGUCUGAG	CUGAUGAG	X	CGAA	IACAGUUU	1145	AAACTGTCT	T	CTCAGAC	1575
1993	GUGGUGCUG	CUGAUGAG	X	CGAA	IAGACAGU	1146	ACTGTCTC	T	CAGACCAC	1576
1995	CUGGUGUC	CUGAUGAG	X	CGAA	IAGAGACA	1147	TGTCTCTC	A	GACCACAG	1577
1999	UAUACUGU	CUGAUGAG	X	CGAA	IUCUGAGA	1148	TCTCAGAC	C	ACAGTATA	1578

Table 10

2000	UUUAUUG CUGAUGAG	X	CGAA	IUGUGUG	1149	CTCAGACC	A	CAGTATAA	1579
2002	GGUUAUAC CUGAUGAG	X	CGAA	IUGUGUG	1150	CAGACCAC	A	GTATAACC	1580
2010	UCUAGUUU CUGAUGAG	X	CGAA	IUUUAUACU	1151	AGTAATAAC	C	AACTAGAA	1581
2011	UUUAUUGU CUGAUGAG	X	CGAA	IUUUAUAC	1152	GTATAAOC	A	AACTAGAA	1582
2015	UGAGUUCU CUGAUGAG	X	CGAA	IUUUGUUU	1153	AACCAAAC	T	AGACTAAA	1583
2021	UUAUUCUG CUGAUGAG	X	CGAA	IUUUCUAGU	1154	ACTGAAGAC	T	CAGGATTA	1584
2023	CUUAUUCU CUGAUGAG	X	CGAA	IAGUUCUA	1155	TAGAATCT	A	GGATTAAAG	1585
2036	UUUUGUGU CUGAUGAG	X	CGAA	IUUUCUUA	1156	TAAGAATC	T	CACTCAAA	1586
2038	GUUUUGAG CUGAUGAG	X	CGAA	IAGUUCU	1157	AGAAATCT	A	CTCAAAAC	1587
2040	UGUUUUUG CUGAUGAG	X	CGAA	IUGAGUUU	1158	AAATCTAC	T	CAAAACCA	1588
2042	UUUGUUUG CUGAUGAG	X	CGAA	IAGUGAGU	1159	ACTCACTC	A	AAACCAAC	1589
2047	AGUUUGUG CUGAUGAG	X	CGAA	IUUUUUGAG	1160	CTCAAAAC	C	ACACAACT	1590
2048	UAGUUUGU CUGAUGAG	X	CGAA	IUUUUUGA	1161	TCAAAACC	A	CACAACTA	1591
2050	UUUAGUUG CUGAUGAG	X	CGAA	IUGUUUUU	1162	AAAACCAC	A	CAACTACA	1592
2052	CAUGUAGU CUGAUGAG	X	CGAA	IUGUGUUU	1163	AAACACAC	A	ACTACATG	1593
2055	UUCCAUGU CUGAUGAG	X	CGAA	IUGUGUGU	1164	CACACAAC	T	ACATGGAA	1594
2058	AGUUUCCA CUGAUGAG	X	CGAA	IUAGUUUGU	1165	ACAATCTA	A	TGGAACCT	1595
2066	GGUUUUUC CUGAUGAG	X	CGAA	IUUUUCAU	1166	ATGGAATC	T	GAACAACC	1596
2071	GAGCAGGU CUGAUGAG	X	CGAA	IUUCAUUGU	1167	AACTGAAC	A	ACTCCTCT	1597
2074	CAGGAGCA CUGAUGAG	X	CGAA	IUUUUUCA	1168	TGAACAAC	C	TGCTCCTG	1598
2075	UCAGGAGC CUGAUGAG	X	CGAA	IUGUUUUC	1169	GAACAACC	T	GTCTCTGA	1599
2078	CAUUCAGG CUGAUGAG	X	CGAA	TCAGUUUG	1170	CAACTCTG	T	CCTGAATG	1600
2080	GUCAUUCA CUGAUGAG	X	CGAA	IAGCAGGU	1171	ACCTGCTC	C	TGAATGAC	1601
2081	AGUCAUUC CUGAUGAG	X	CGAA	IGAGCAGG	1172	CCTGCTCT	T	GAATGACT	1602
2089	UAUCCAGU CUGAUGAG	X	CGAA	IUCAUUCA	1173	TGAATGAC	T	ACTGGATA	1603
2092	AUGUAUCC CUGAUGAG	X	CGAA	IUAGUCAU	1174	ATGACTAC	T	GGATACAT	1604
2099	UUUUUGUU CUGAUGAG	X	CGAA	IUAUCCAG	1175	CTGGATAC	A	TAACAAAA	1605
2104	CUUCAUUU CUGAUGAG	X	CGAA	IUUUAUGA	1176	TACATAAC	A	AAATGAAG	1606
2115	UUUAUUUC CUGAUGAG	X	CGAA	TCUUUCAU	1177	ATGAAGGC	A	GAATAAAA	1607
2131	GGUUUUAA CUGAUGAG	X	CGAA	IAACAUCU	1178	AGATGTTC	T	TTAAAAAC	1608
2139	UUUCUAUU CUGAUGAG	X	CGAA	IUUUUAAA	1179	TTTAAAC	C	AATGAGAA	1609
2140	GUUUUCAU CUGAUGAG	X	CGAA	IUUUUUAA	1180	TTTAAACC	A	ATGAGAAC	1610
2149	UGUGUCUU CUGAUGAG	X	CGAA	IUUCUCAU	1181	ATGAGAAC	A	AAGACACA	1611
2155	GUUGUUGU CUGAUGAG	X	CGAA	IUUUUUGU	1182	ACAAGAAC	A	CAACATAC	1612
2157	UGUUAUGU CUGAUGAG	X	CGAA	IUGUCUUU	1183	AAAGACAC	A	ACATACCA	1613
2160	UUUCUGUA CUGAUGAG	X	CGAA	IUUGUGUC	1184	GACACAAC	A	TACGAGAA	1614
2164	GAGAUUCU CUGAUGAG	X	CGAA	IUAUGUUG	1185	CAACATAC	C	AGAATCTC	1615
2165	AGAGAUUC CUGAUGAG	X	CGAA	IUGAUUUU	1186	AAATATAC	A	GAATCTCT	1616
2171	UGUCCAG CUGAUGAG	X	CGAA	IUUUCUGG	1187	CCAGATCT	T	CTGGAGCA	1617
2173	UGUGUCCC CUGAUGAG	X	CGAA	IAGAUCUU	1188	AGAATCTC	T	GGACACAA	1618
2179	UUUGAUUG CUGAUGAG	X	CGAA	IUCCAGAA	1189	TCTGGGAC	A	CATTCAAA	1619
2181	GCUUUGAA CUGAUGAG	X	CGAA	IUGUCCCA	1190	TGGGACAC	A	TTCAAGAC	1620
2185	CACUGCUU CUGAUGAG	X	CGAA	IAAUGUGU	1191	ACACATTC	A	AAGCAGTG	1621
2190	CUACACAC CUGAUGAG	X	CGAA	IUUUGGAA	1192	TTCAAGAC	A	GTGTGTAG	1622
2214	GCAUUUAG CUGAUGAG	X	CGAA	IUAUAAAA	1193	TTTATAGC	A	CTAAATGC	1623
2216	GGCAUUUU CUGAUGAG	X	CGAA	IUGCUAUA	1194	TATAGCAC	T	AAATGCC	1624
2223	CUUUUGUG CUGAUGAG	X	CGAA	ICAUUUAG	1195	CTAAATGC	C	CACAAGAG	1625

Table 10

2224	UCUCUUGU	CUGAUGAG	X	CGAA	IGCAUUUA	1196	TAAATGCC	C	ACAAGAGA	1626
2225	UUUCUUGG	CUGAUGAG	X	CGAA	IGGCAUUU	1197	AAATGCCC	A	CAAGAGAA	1627
2227	CUUUUCUC	CUGAUGAG	X	CGAA	IUGGGCAU	1198	ATGCCACC	A	AGAGAAAG	1628
2237	AUAUUUCC	CUGAUGAG	X	CGAA	ICUUUCUC	1199	GAGAAGCC	A	GGAAATAT	1629
2247	UCAAUUUU	CUGAUGAG	X	CGAA	IAUAUUUC	1200	GAAATATC	T	AAAATTGA	1630
2257	UGUUAOGG	CUGAUGAG	X	CGAA	IUCAAUUU	1201	AAATTGAC	A	CCCTAACA	1631
2259	GAUGUUGA	CUGAUGAG	X	CGAA	IUGUCAAU	1202	ATTGACAC	C	CTAACATC	1632
2260	UGAUGUUA	CUGAUGAG	X	CGAA	IGUGUCAA	1203	TTGACACC	C	TAAACATC	1633
2261	GUGAUGUU	CUGAUGAG	X	CGAA	IGGUGUCA	1204	TGACACCC	T	AACATCAC	1634
2265	AAUUGUGA	CUGAUGAG	X	CGAA	IUUGUGGU	1205	ACCTTAAC	A	TCACAATT	1635
2268	UUUAUUUG	CUGAUGAG	X	CGAA	IAUGUUAG	1206	CTAACATC	A	CAATTAAA	1636
2270	CUUUUAAU	CUGAUGAG	X	CGAA	IUGAUGUU	1207	AACATCAC	A	ATTAAGAG	1637
2282	GCUCUCUC	CUGAUGAG	X	CGAA	IUUCUUUU	1208	AAAAGAAC	T	AGAGAAGC	1638
2291	UUUGUCUC	CUGAUGAG	X	CGAA	ICUUCUCU	1209	AGAGAAGC	A	AGAGCAAA	1639
2297	AAUGUGUU	CUGAUGAG	X	CGAA	ICUCUUGC	1210	GCAGAAGC	A	AACACATT	1640
2301	UUUCAAUG	CUGAUGAG	X	CGAA	IUUUGUCV	1211	GAGCAAAC	A	CATTGAAT	1641
2303	CUUUUCAA	CUGAUGAG	X	CGAA	IUGUUUUC	1212	GCAACAC	A	TTGAAAAG	1642
2313	CUUCUCUU	CUGAUGAG	X	CGAA	ICUUUUCA	1213	TGAAAAGC	T	AAGAGAAG	1643
2324	UUUUUUUC	CUGAUGAG	X	CGAA	ICCUUUCV	1214	GAGAAGGC	A	AGAAATAA	1644
2334	CUGAUCUU	CUGAUGAG	X	CGAA	IUUUUUUC	1215	GAAATTAAC	T	AGATTCAG	1645
2341	UUUCUGUC	CUGAUGAG	X	CGAA	IAUCUUAG	1216	CTAAGATC	A	GAGCAGAA	1646
2346	UUCAGUUC	CUGAUGAG	X	CGAA	ICUCUGAU	1217	ATCACAGC	A	GAACCTGA	1647
2351	UUUCUUCU	CUGAUGAG	X	CGAA	IUUCUGCU	1218	AGCAGAAC	T	GAGGAAAA	1648
2367	GUUUUUUG	CUGAUGAG	X	CGAA	IUCUCUAU	1219	ATAGAGAC	A	CAAAAAAC	1649
2369	GAGUUUUU	CUGAUGAG	X	CGAA	IUGUCUCU	1220	AGAGACAC	A	AAAAACTC	1650
2376	UUUUUAGG	CUGAUGAG	X	CGAA	IUUUUUUG	1221	CAAAAAAC	T	CTTCAAAA	1651
2378	UUUUUUGA	CUGAUGAG	X	CGAA	IAGUUUUU	1222	AAAAACTC	T	TCAAAAAA	1652
2381	UGAUUUUU	CUGAUGAG	X	CGAA	IAAGAGUU	1223	AACCTTTC	A	AAAAATCA	1653
2389	GGAUUUCAU	CUGAUGAG	X	CGAA	IAUUUUUU	1224	AAAAAATC	A	ATGAATCC	1654
2397	CAGCUCUU	CUGAUGAG	X	CGAA	IAUUCUAU	1225	AATGAATC	C	AGGAGCTG	1655
2398	CCAGCUCU	CUGAUGAG	X	CGAA	IGAUUCAU	1226	ATGAATCC	A	GGAGCTGG	1656
2404	AAAAAACCC	CUGAUGAG	X	CGAA	ICUCCUGG	1227	CCAGGAGC	T	GGTTTTTT	1657
2422	AAUUUUUG	CUGAUGAG	X	CGAA	IAUCGUUU	1228	AAACGATC	A	ACAAAATT	1658
2425	AUCAAUUU	CUGAUGAG	X	CGAA	IUGAUCUG	1229	CGATCAAC	A	AAATTGAT	1659
2438	CUUGCUAG	CUGAUGAG	X	CGAA	IUCUAUCA	1230	TGATAGAC	A	CTAGCAAG	1660
2440	GUUUUCU	CUGAUGAG	X	CGAA	IUGUCUAU	1231	ATAGACAC	T	AGCAAGAC	1661
2444	AUAAGUCU	CUGAUGAG	X	CGAA	ICUAGUGU	1232	ACACTAGC	A	AGACTAAT	1662
2449	UCUUUAUU	CUGAUGAG	X	CGAA	IUCUUGCU	1233	AGCAAGAC	T	AATAAGAA	1663
2476	CUUCUAUU	CUGAUGAG	X	CGAA	IAUUCUUC	1234	GAAGCAATC	A	CTAGAAGG	1664
2486	UUUUUUAU	CUGAUGAG	X	CGAA	ICUUCUAU	1235	ATAGAAGC	A	ATAAAAAA	1665
2511	AUUGUGUG	CUGAUGAG	X	CGAA	IAUAUCCC	1236	GGGATATC	A	CCCAACAT	1666
2513	GGAUUGGU	CUGAUGAG	X	CGAA	IUGAUAUC	1237	GATATCAC	C	ACCAATCC	1667
2514	GGGAUUGG	CUGAUGAG	X	CGAA	IUGUAUAU	1238	ATATCAC	C	CCAATCCC	1668
2516	GUGGGAUU	CUGAUGAG	X	CGAA	IUGUGUAU	1239	ATCACAC	C	AATCCCAC	1669
2517	UGUGGGAU	CUGAUGAG	X	CGAA	IUGGGUGA	1240	TCACCAAC	A	CCACCACA	1670
2521	UUUCUGUG	CUGAUGAG	X	CGAA	IAUUGGUG	1241	CACCAATC	C	CACAGAAA	1671
2522	AUUUCUGU	CUGAUGAG	X	CGAA	IGAUUGGU	1242	ACCAATCC	C	ACAGAAAT	1672

Table 10

2523	UAUUUCUG CUGAUGAG X CGAA	IGGAUUGG	1243	CCATCC C A CAGAAATA	1673
2525	UUUAUUUC CUGAUGAG X CGAA	IUGGAUUU	1244	AATCCAC A GAAATAA	1674
2535	CUGAUGGU CUGAUGAG X CGAA	IUUUAUUU	1245	AAATAAC C ACCATCAG	1675
2536	UCUGAUGG CUGAUGAG X CGAA	IGUUUAUU	1246	AATAAAC C CATCAGA	1676
2538	UCUCUGAU CUGAUGAG X CGAA	IUGGUUA	1247	TAAACAC C ATCAGAGA	1677
2539	UUUCUGA CUGAUGAG X CGAA	IUGGUUU	1248	AAACACC A TCAGAGAA	1678
2542	GUUUUCUC CUGAUGAG X CGAA	TAUGGUGG	1249	CCACATC A GAGATAC	1679
2551	GUGUUUGU CUGAUGAG X CGAA	IUAUUCUC	1250	GAGATAC T AACACAC	1680
2554	GAGGUGUU CUGAUGAG X CGAA	TUAGUAUU	1251	AATACTAC A AACACCTC	1681
2558	CGUAGAGG CUGAUGAG X CGAA	TUUUAUAG	1252	CTACAAAC A CCTCTACG	1682
2560	UGCGUAGA CUGAUGAG X CGAA	IUGUUUGU	1253	ACAAACAC C TCTACGCA	1683
2561	IUGCGUAG CUGAUGAG X CGAA	IUGUUUG	1254	CAAACACC T CTACGCA	1684

Input Sequence = HSU29607. Cut Site = CH/			
Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)			
Seq1 = HSU29607 (Human methionine aminopeptidase mRNA, complete cds., 2369 bp)			

Table 11

Table 11: Human Methionine Aminopeptidase type 2 (MetAP-2) G-cleaver Ribozyme and Target Sequence

Nt. position	Substrate Sequence	Seq. ID Nos.	Ribozyme Sequence	Seq. ID Nos.
64	GGAGCACCCT G AAUGG	1685	CCAUU UGAUGGCAUGCAUAUGCGCG AGGUGGCUCC	1834
71	CCUGAUAUGC G ACCUG	1686	CNGGU UGAUGGCAUGCAUAUGCGCG GCCAUUGAG	1835
86	GGAUCCAGAC G ACUAG	1687	CCUGU UGAUGGCAUGCAUAUGCGCG GUCUGAUCC	1836
104	AGAAAGGAGCT G CCUCU	1688	AGAGG UGAUGGCAUGCAUAUGCGCG AGCUCUUGU	1837
116	GUCUACGGCU G AGGAA	1689	UUCUU UGAUGGCAUGCAUAUGCGCG AGCCCUAGAG	1838
141	AAAAAAGAG G AAGAA	1690	UUCUU UGAUGGCAUGCAUAUGCGCG GUCUUUUUU	1839
170	AGGCGCUCUCU G CAGCA	1691	UGCUG UGAUGGCAUGCAUAUGCGCG AGAAGGCCCU	1840
191	ACGAGACCU G AURAA	1692	UUUAU UGAUGGCAUGCAUAUGCGCG AGGUTCUCU	1841
218	CUCAGGGAU G AAGUA	1693	UACUU UGAUGGCAUGCAUAUGCGCG AUCCACUAG	1842
269	AGAAAGAGU G AAGUU	1694	AUCUU UGAUGGCAUGCAUAUGCGCG AUCUCUUCU	1843
275	AGAUAAGAU G AUGAA	1695	UUCAU UGAUGGCAUGCAUAUGCGCG AUCUCAUCU	1844
278	UGAUAAGAU G AAGAU	1696	AUCUU UGAUGGCAUGCAUAUGCGCG AUCAUCUUA	1845
293	UGAGAUGGC G AUGGA	1697	UCCAU UGAUGGCAUGCAUAUGCGCG GCCAUUCUA	1846
384	GUUCACUAU G UGACC	1698	GGUCA UGAUGGCAUGCAUAUGCGCG AUAUUGGAC	1847
386	UCCAUUAUGU G ACCUG	1699	CAGGU UGAUGGCAUGCAUAUGCGCG ACUAUUGGA	1848
391	UAUGUGACCU G UAUCC	1700	GGUAU UGAUGGCAUGCAUAUGCGCG AGUCACUAU	1849
404	UCCUAUUGU G UAUUU	1701	AAAUU UGAUGGCAUGCAUAUGCGCG ACCAUUGGA	1850
426	GGACAGAGU G CGAAU	1702	AUUGG UGAUGGCAUGCAUAUGCGCG AUUCUUUCC	1851
428	ACAAGAAUGC G AUUAC	1703	GUUUU UGAUGGCAUGCAUAUGCGCG GCAUUCUUGU	1852
453	CAAGAUGGC G AACAG	1704	CUUUU UGAUGGCAUGCAUAUGCGCG GCCCAUCUUG	1853
461	CGGACAGCU G CUUUG	1705	CCAAG UGAUGGCAUGCAUAUGCGCG AGCUGUUGC	1854
479	AACUACAGU G AAGAA	1706	UUCUU UGAUGGCAUGCAUAUGCGCG ACUGUAUUGU	1855
509	UCAGGCAAGU G AAGAG	1707	CUUUU UGAUGGCAUGCAUAUGCGCG ACUUGCCUGA	1856
524	GAUUUGGAU G AUUUU	1708	AAAUU UGAUGGCAUGCAUAUGCGCG AUUCCAAUC	1857
531	AAUUNUUUC G AGAAG	1709	CUUUU UGAUGGCAUGCAUAUGCGCG GAUAUAUUGU	1858
539	UCGAGAGCU G CAGAA	1710	UUCUG UGAUGGCAUGCAUAUGCGCG AGCUCUUGA	1859
552	GAACACAU G ACAAG	1711	CUUUU UGAUGGCAUGCAUAUGCGCG GAUGUGUUC	1860
574	AAUACGUAU G AGCUG	1712	CAGCU UGAUGGCAUGCAUAUGCGCG AUUACGUUUU	1861

Table 11

595	AGCCUGGAGU G ACAAU	1713	AIDUG	UGAUGGCAUGCAUAUGCGG	AUCCAGGCU	1862
601	GGAUGCAU G AUGA	1714	UCUAU	UGAUGGCAUGCAUAUGCGG	AUURCAUCC	1863
612	AUGAAAUUCU G UGAAA	1715	UUUCA	UGAUGGCAUGCAUAUGCGG	AGAUUUCU	1864
614	AGAAUAUCUGU G AAAAG	1716	CUUUU	UGAUGGCAUGCAUAUGCGG	ACAGAUUCU	1865
630	UUGGAGAGCU G UUCAC	1717	GUGAA	UGAUGGCAUGCAUAUGCGG	AGUUCUCCA	1866
636	GACUGUAC G CAGAU	1718	ACUUG	UGAUGGCAUGCAUAUGCGG	GUGAACAGUC	1867
665	UGAUUAAAU G CAGGC	1719	GCUCU	UGAUGGCAUGCAUAUGCGG	AUTUAUCCA	1868
690	CCUACUGAGU G UUCUC	1720	GAGAA	UGAUGGCAUGCAUAUGCGG	AUCCAGUAG	1869
705	CUCAAUAUU G UUCUG	1721	CAGCA	UGAUGGCAUGCAUAUGCGG	AAUUAUAG	1870
707	CAUAUAUUU G CUGCC	1722	GGCAG	UGAUGGCAUGCAUAUGCGG	ACAAUAUUG	1871
710	UAUAUUGCU G CCGAU	1723	AUGGG	UGAUGGCAUGCAUAUGCGG	AGCACAUAU	1872
728	UAUCUCCAU G CCGGU	1724	ACCGG	UGAUGGCAUGCAUAUGCGG	AUUGGAGUA	1873
734	CAUUGCCGGU G ACACA	1725	UGUGU	UGAUGGCAUGCAUAUGCGG	ACCGGCAUUG	1874
755	AUAACAGAU G AUGAC	1726	GUCAU	UGAUGGCAUGCAUAUGCGG	AUAUCUUAU	1875
758	ACAGUAUAGU G ACUUC	1727	GAUGU	UGAUGGCAUGCAUAUGCGG	AUCAUAUCU	1876
765	GAUGACAUCU G UAAAA	1728	UUUUU	UGAUGGCAUGCAUAUGCGG	AGAUUGAUC	1877
806	UAGGAUAUU G ACUGU	1729	ACAGU	UGAUGGCAUGCAUAUGCGG	AUAUAUCUA	1878
810	AUAUAUGCU G UGCUU	1730	AAGCA	UGAUGGCAUGCAUAUGCGG	AGUCAAUAU	1879
812	UAUUGACUGU G CUUUU	1731	AAAAG	UGAUGGCAUGCAUAUGCGG	ACAGUCAAUA	1880
821	UUCUUUAUCU G UCACU	1732	AGUGA	UGAUGGCAUGCAUAUGCGG	AGUAAAAGCA	1881
842	UCCCAUAUU G AUACG	1733	CUUAU	UGAUGGCAUGCAUAUGCGG	AUAUUGGGA	1882
860	AUAUAAAGCU G UAAAA	1734	UUUUU	UGAUGGCAUGCAUAUGCGG	AGCUUUUAU	1883
869	UUAUAAAGU G CUACU	1735	AGUAG	UGAUGGCAUGCAUAUGCGG	AUCUUUAUA	1884
891	GGAAUAAGU G UGUCU	1736	CAGCA	UGAUGGCAUGCAUAUGCGG	ACUUAUUC	1885
893	AAUAUAAGUGU G CUGGA	1737	UCCUG	UGAUGGCAUGCAUAUGCGG	ACAUUUUAU	1886
902	UGCUGGAUU G AUGUU	1738	AACAU	UGAUGGCAUGCAUAUGCGG	AAUUCAGCA	1887
905	UGGUAUAUU G UUGGU	1739	ACGAA	UGAUGGCAUGCAUAUGCGG	AUCAUUAUA	1888
913	AUGUUGGUCU G UUGUA	1740	UCCAU	UGAUGGCAUGCAUAUGCGG	AGACGAACAU	1889
915	GUUCUUCUGU G UGAUG	1741	CAUCA	UGAUGGCAUGCAUAUGCGG	ACACGCGAAC	1890
917	UUCUUGUUGU G AUGUU	1742	AACAU	UGAUGGCAUGCAUAUGCGG	ACACGAGCA	1891
920	UCUUGUGUAU G UUGGU	1743	ACCAA	UGAUGGCAUGCAUAUGCGG	AUCCACAGA	1892

Table 11

926	UGAUGUGUGU G AGGCC	1744	GGCCU UGAUGGCAUGCAUAUGCCGG ACCAACAUCA	1893
956	GGAGUCCUUAU G AAGGU	1745	AAUUU UGAUGGCAUGCAUAUGCCGG AUAGSAGUCC	1894
962	CUAUGAGUUU G AAADA	1746	UAUUU UGAUGGCAUGCAUAUGCCGG AACUUCAUAG	1895
988	CAUAUACAAGU G AAACC	1747	GGUUU UGAUGGCAUGCAUAUGCCGG ACUUAUAUAG	1896
1040	UGAAUACAAU G CUGGA	1748	UCCAG UGAUGGCAUGCAUAUGCCGG AUGUAUAUUA	1897
1054	GAAGAACAAU G CCGAU	1749	AUCCG UGAUGGCAUGCAUAUGCCGG ACUBUUUUUC	1898
1057	AAACAGUCC G ABUUG	1750	ACAAU UGAUGGCAUGCAUAUGCCGG GGCACUGUUU	1899
1061	AGUCCCGAUU G UGAAA	1751	UUUCA UGAUGGCAUGCAUAUGCCGG AAUCCGGACU	1900
1063	UGCCGUAUUU G AAAGG	1752	CCUUU UGAUGGCAUGCAUAUGCCGG ACANUGGSCA	1901
1106	AGAGUAUAU G CAUUU	1753	AAUUG UGAUGGCAUGCAUAUGCCGG AAUAUACUUU	1902
1112	AUAUGCAUUU G AAACC	1754	GGUUU UGAUGGCAUGCAUAUGCCGG AUGUUAUAU	1903
1139	AGGMAAAGGU G UUGUU	1755	AAACA UGAUGGCAUGCAUAUGCCGG ACCUUUUUCU	1904
1142	AAAAGUGUU G UUCAU	1756	AUGAA UGAUGGCAUGCAUAUGCCGG AACACCUUUU	1905
1146	UUUUGUUAU G AUGAU	1757	AUCAA UGAUGGCAUGCAUAUGCCGG AUGACAAACA	1906
1151	UUUUCAUAU G AUAUG	1758	CAUAU UGAUGGCAUGCAUAUGCCGG AUGCAUGACA	1907
1161	GAUAUGGAU G UUCAC	1759	GUGAA UGAUGGCAUGCAUAUGCCGG AUUCCAUUAC	1908
1174	CACAUUAU G AAAAA	1760	UUUUU UGAUGGCAUGCAUAUGCCGG AUGUAUUGU	1909
1184	GAAGAAUUUU G AUGUU	1761	ACAAU UGAUGGCAUGCAUAUGCCGG AAAUUUUUC	1910
1187	AAAUUUUAU G UUGCA	1762	UCCAA UGAUGGCAUGCAUAUGCCGG AUCMAAUUUU	1911
1196	UUUUGACAUU G UGCCA	1763	UGSCA UGAUGGCAUGCAUAUGCCGG AUGUCCAACA	1912
1198	UUGGACAUU G CCAAU	1764	AUUGG UGAUGGCAUGCAUAUGCCGG ACAGUCCCAA	1913
1228	CAAAACAUU G UDAAA	1765	UUUAA UGAUGGCAUGCAUAUGCCGG AAGRUUUUUG	1914
1235	CUUUGUAUU G UCAUC	1766	GAUGA UGAUGGCAUGCAUAUGCCGG AUUUUAAACAG	1915
1244	UGUUAUAUU G AAABC	1767	GUUUU UGAUGGCAUGCAUAUGCCGG AUUUGAGACA	1916
1262	CUUACCUUUU G CCUUC	1768	GAAGG UGAUGGCAUGCAUAUGCCGG AAGGUUUCCA	1917
1269	CUUACCUUUU G CCGCA	1769	UGCGG UGAUGGCAUGCAUAUGCCGG AGAAGGCGAG	1918
1272	GCUUUUGCC G CAGAU	1770	AUUGG UGAUGGCAUGCAUAUGCCGG GGCACAGAGC	1919
1287	UGGCGGGAUC G CUUGG	1771	CCMAG UGAUGGCAUGCAUAUGCCGG GAUCCAGCCA	1920
1309	GUAAUAUAU G AUGGC	1772	GGCCU UGAUGGCAUGCAUAUGCCGG AAGUAUUUAC	1921
1318	UGAUUGCUU G AAGBA	1773	UUUUU UGAUGGCAUGCAUAUGCCGG AGAGCCCAUCA	1922
1327	UGAGUAUUU G UUGUA	1774	UCCAA UGAUGGCAUGCAUAUGCCGG AAGUUUCCA	1923

Table 11

1329	AAGAUAUGU G UGACU	1775	AGUCA UGAUGGCAUGCAUAUGCGG ACAGUAUCUU	1924
1331	GAUUCUUGU G ACUUG	1776	CAAGU UGAUGGCAUGCAUAUGCGG ACACAGAUUC	1925
1343	CUUGGGCAUU G UGAUU	1777	AUCUA UGAUGGCAUGCAUAUGCGG AAUGCGCAAG	1926
1365	CCACCAUUU G UGACA	1778	UUUCA UGAUGGCAUGCAUAUGCGG AUUAUGGUGG	1927
1367	ACCUUAUGU G ACUAU	1779	AAUGU UGAUGGCAUGCAUAUGCGG ACUAUAUGU	1928
1390	CAUAUACAG G CAAUU	1780	AAUUG UGAUGGCAUGCAUAUGCGG GCUGUAUUG	1929
1397	AGCGCAUUU G UGACU	1781	AUGUU UGAUGGCAUGCAUAUGCGG AAUAUGCGCU	1930
1411	AUACGUCUU G UGCG	1782	GCMAA UGAUGGCAUGCAUAUGCGG AGGAUGGUAU	1931
1425	CGUCCACAU G UAAAG	1783	GGACG UGAUGGCAUGCAUAUGCGG AACGAGAUUG	1932
1436	UAAGAAGUU G UGAGC	1785	CUUUA UGAUGGCAUGCAUAUGCGG AUGUGGAGCG	1933
1451	CAGAGAGAU G ACUAU	1786	GUUGA UGAUGGCAUGCAUAUGCGG AACUCUUAUA	1934
1496	UUUAUUUUU G AGCUU	1787	AUGUU UGAUGGCAUGCAUAUGCGG AUUCUCCUUG	1935
1503	UCUGAGUUU G UUGGA	1788	UCCAA UGAUGGCAUGCAUAUGCGG AGAAAUUAAA	1936
1515	UGGMAACAU G AUACC	1789	GGUAU UGAUGGCAUGCAUAUGCGG AUGUUAUCCA	1937
1532	GAUUAUAUU G CCACA	1790	UUGUG UGAUGGCAUGCAUAUGCGG MAUAUAUUC	1938
1539	UUUSGCCAUU G UUGUC	1791	GACAA UGAUGGCAUGCAUAUGCGG AUGUGGCAAA	1940
1542	GCACAUUU G UCUUU	1792	ACAGA UGAUGGCAUGCAUAUGCGG AACAUUGGCG	1941
1546	CAUUGUGUU G UUUUA	1793	UAAAA UGAUGGCAUGCAUAUGCGG AGACMACUUG	1942
1565	GUUGACCAU G UUAUA	1794	UAUUA UGAUGGCAUGCAUAUGCGG AUGGUGUAC	1943
1582	UUUAUCCAU G UUUAA	1795	UUAAA UGAUGGCAUGCAUAUGCGG AUGGAUAAA	1944
1624	ACCCUUAUU G UAAUU	1796	AAUUA UGAUGGCAUGCAUAUGCGG AUAGACGUG	1945
1637	AUAACCAAC G AAAAA	1797	UUUUU UGAUGGCAUGCAUAUGCGG GUUGGUAUU	1946
1662	ACUUUAUUU G CUUAC	1798	GUUUG UGAUGGCAUGCAUAUGCGG AUUUAUAAUU	1947
1669	AUAGCUAAU G UUUUU	1799	AAAAA UGAUGGCAUGCAUAUGCGG AUUAGAUUU	1948
1684	UCCCUUCCU G UCUAG	1800	CUAGA UGAUGGCAUGCAUAUGCGG AGAGAGGGA	1949
1696	CUAGAAAUU G CUUUA	1801	UUUAG UGAUGGCAUGCAUAUGCGG AUUUUCCUAG	1950
1723	AGUUGGAUU G UUUUA	1802	UAAGU UGAUGGCAUGCAUAUGCGG AUUUCUACU	1951
1737	UAUACGUUU G UUUUG	1803	CAAAA UGAUGGCAUGCAUAUGCGG AAAACUUAUA	1952
1742	GUUUUGUUU G AUUAC	1804	GUUUU UGAUGGCAUGCAUAUGCGG AAAACAAAC	1953
1777	UAUUUAUUU G CCAUA	1805	UAUGG UGAUGGCAUGCAUAUGCGG AAUUAUAAA	1954

Table 11

1752	AUUCUUAU G AUUG	1806	GCATU UGAUGGCAUGCAUAUGCGG AUUAACAAU	1955
1756	UUAUUGAU G CUUG	1807	CAAG UGAUGGCAUGCAUAUGCGG AUUAACAAU	1956
1801	UGAUGCUU G AUGA	1808	UCATU UGAUGGCAUGCAUAUGCGG AAGCAUUA	1957
1805	UGCUUUGAU G ACUAC	1809	GUAGU UGAUGGCAUGCAUAUGCGG AUUAACAAU	1958
1821	AUCAGUUGU G CACCU	1810	AGUGU UGAUGGCAUGCAUAUGCGG AGAUCUGAU	1959
1839	ACCCUUGU G UUCU	1811	AGCAA UGAUGGCAUGCAUAUGCGG ACCAGAGGU	1960
1842	CCUUGUGU G CUUU	1812	AAAGU UGAUGGCAUGCAUAUGCGG AACACAGAG	1961
1924	UUCCAAAU G ACCAC	1813	GUUGU UGAUGGCAUGCAUAUGCGG GAUUGGAA	1962
1961	CUAGGAAU G UAAUA	1814	UUUUA UGAUGGCAUGCAUAUGCGG AUUGCUGAG	1963
1988	AUAACAAU G UCUCU	1815	AGAGA UGAUGGCAUGCAUAUGCGG AGUUGUAU	1964
2067	CUUGNAU G AACAA	1816	UUGUU UGAUGGCAUGCAUAUGCGG AGUUGUAU	1965
2076	UGAACAAU G CUUCU	1817	AGAGU UGAUGGCAUGCAUAUGCGG AGGUGUAU	1966
2082	ACUUGUCU G AUAUA	1818	UCATU UGAUGGCAUGCAUAUGCGG AGGAGAGU	1967
2086	GUUCUGAU G AUUAC	1819	GUAGU UGAUGGCAUGCAUAUGCGG AUUCAGAGC	1968
2109	AUAACAAU G AAGGC	1820	GUUUU UGAUGGCAUGCAUAUGCGG AUUUUGUAU	1969
2127	AAUAACAAU G UCUCU	1821	AAGAA UGAUGGCAUGCAUAUGCGG AUUCUAUUA	1970
2143	UAAUAACAAU G AGAAC	1822	GUUCU UGAUGGCAUGCAUAUGCGG AUUGGUUAU	1971
2193	UUAAGCAU G UGUAG	1823	CUACA UGAUGGCAUGCAUAUGCGG ACUGGUUAU	1972
2195	AAGCAUGU G UAGAG	1824	CUUUA UGAUGGCAUGCAUAUGCGG ACACUGUUA	1973
2221	AGCAUAU G CCAC	1825	GUUGU UGAUGGCAUGCAUAUGCGG AUUUGUUAU	1974
2254	AUCUAAAU G ACAC	1826	GUUGU UGAUGGCAUGCAUAUGCGG AUUUGUUAU	1975
2306	CAACCAU G AAGAG	1827	CUUUU UGAUGGCAUGCAUAUGCGG AAGUGUUAU	1976
2352	GAGCAAAU G AAGGA	1828	UCUUU UGAUGGCAUGCAUAUGCGG AGUUGUUAU	1977
2392	AAUAACAAU G AUUUC	1829	GAUUU UGAUGGCAUGCAUAUGCGG AUUGGUUAU	1978
2413	CUUGUUUUU G AAGAG	1830	CUUUU UGAUGGCAUGCAUAUGCGG AAAAAAUAU	1979
2418	UUUUUUAU G AUAUA	1831	UUGAU UGAUGGCAUGCAUAUGCGG GUUUUUAU	1980
2431	CAUAUAU G AUAUA	1832	UCUAU UGAUGGCAUGCAUAUGCGG AUUUUGUUAU	1981
2496	AAUAAAAAU G AUAUA	1833	UUUAU UGAUGGCAUGCAUAUGCGG AUUUUUUAU	1982

Input Sequence = H5029607. Cut Site = YG/M or UG/U.

Stem Length = 5/10. Core Sequence = UGAUG GCAUGGCAUGCG GCG

Table 11

Seq1 = HSU29607 (Human methionine aminopeptidase mRNA, complete cda., 2569 bp)	

Table 12: Anti Human MetAP-2 HH, NCH, and G-Cleaver Ribozymes

Alias	Ribozyme Sequence	Seq. ID Nos.	Substrate Seq.	Seq. ID Nos.
HH				
MAP2-11	CCGAGG CUGAUGAGGCCGUUAGGCCGAA AGACGAG	1983	CUCGUCC C UCUCCGG	2001
MAP2-15	GUUCCCC CUGAUGAGGCCGUUAGGCCGAA AGACGAA	1984	UCUUCUC C GGGCAGC	2002
MAP2-464	GUUCCCC CUGAUGAGGCCGUUAGGCCGAA AGACGCU	1985	AGCUGCU U GGAGAAC	2003
MAP2-911	UCACAA CUGAUGAGGCCGUUAGGCCGAA AGCAACA	1986	UUUCUGU C UUUUGUA	2004
MAP2-1290	UUUCCCC CUGAUGAGGCCGUUAGGCCGAA AGCAUIC	1987	GAUCGCU U GGGAGAA	2005
MAP2-1342	GAUCUAC CUGAUGAGGCCGUUAGGCCGAA AUGCCCA	1988	UGGCGAU U GUGAUC	2006
MAP2-1479	AGUGUU CUGAUGAGGCCGUUAGGCCGAA AGUGGCG	1989	GCCACCU C AACACAC	2007
MAP2-1616	GUCCGGA CUGAUGAGGCCGUUAGGCCGAA AGCUUUU	1990	AAAAGCU U UCCGGAC	2008
MAP2-1819	AGGUCCA CUGAUGAGGCCGUUAGGCCGAA AACUGGA	1991	UCCAGUU C UGACCU	2009
MAP2-2262	GUGAUGU CUGAUGAGGCCGUUAGGCCGAA AGGUGUU	1992	ACACCCU A ACAUAC	2010
MAP2-10	CCGAGAG CUGAUGAGGCCGUUAGGCCGAA GACGAGG	1993	CCUCGUC U CUCUGGG	2011
NCH				
MAP2-369	AAACUGAG CUGAUGAGGCCGUUAGGCCGAA IAGGUCU	1994	GACCCUC C CUCAGUU	2012
MAP2-370	GAACUGA CUGAUGAGGCCGUUAGGCCGAA IGAGGCU	1995	ACCCUCC C UGAGUUC	2013
MAP2-1901	GUUGUGU CUGAUGAGGCCGUUAGGCCGAA TUGUGUA	1996	UCAGGAC C AGACAC	2014
MAP2-1906	UNGUGUU CUGAUGAGGCCGUUAGGCCGAA UUGUGUU	1997	ACCAACG A ACACUA	2015
G-Cleaver				
MAP2-1821	AGGUG UGAUGGCAUGCAUAUGGCCG AGAACUGGAU	1998	AUCCAGUUC G CACCU	2016
MAP2-2076	AGGAG UGAUGGCAUGCAUAUGGCCG AGGUGUUA	1999	UGAACACCU G CUCCU	2017
MAP2-2086	GUGUU UGAUGGCAUGCAUAUGGCCG AUUCAGGAGC	2000	GUUCCUGAU G ACUAC	2018

Table 13

Table 13: Human telomerase reverse transcriptase (TERT) Hammerhead Ribozyme and Target Sequence

nt. Position	Ribozyme Sequence	Seq ID Nos.	Substrate Sequence	Seq ID Nos.
13	GCAGCAG CUGAUGAG X CGAA ACGCAGCG		CGCTGCGT C CTGCTGCG	
68	GCAGCGGG CUGAUGAG X CGAA AGCGCGCG		CGCGCGCT C CCGCGTGC	
90	GCAGCAGG CUGAUGAG X CGAA AGCGCAGC		CGTGCCT C CCGCTGCG	
108	CCUCGCG CUGAUGAG X CGAA AGUGGCG		CAGCCACT A CCGCGAGG	
135	CGCGCAG CUGAUGAG X CGAA ACGUGGCC		GGCCACGT T CCGCGCGC	
136	CGCGCAC CUGAUGAG X CGAA ACGUGGC		GCCACGT T CCGCGCGC	
194	CGCGCGA CUGAUGAG X CGAA AGCGCGCG		CGCGCGCT T TCGCGCGC	
195	CGCGCGGG CUGAUGAG X CGAA AAGCGCGC		CGCGCGCT T CCGCGCGC	
196	AGCGCGG CUGAUGAG X CGAA AAGCGCGC		CGCGCGCT T CCGCGCGC	
264	GGCGGAG CUGAUGAG X CGAA AGGCGCGC		CGCGCGCT T CCGCGCGC	
267	CCUGCGG CUGAUGAG X CGAA AGGAGGGG		CGCGCGCT T CCGCGCGC	
268	ACUGGCG CUGAUGAG X CGAA AGGAGGGG		CGCGCGCT T CCGCGCGC	
279	UCAGGCAG CUGAUGAG X CGAA ACACCGG		CGCGCGCT T CCGCGCGC	
351	CGAAGCG CUGAUGAG X CGAA AGGCCAGC		CGCGCGCT T CCGCGCGC	
352	CGAAGCC CUGAUGAG X CGAA AAGGCCAG		CGCGCGCT T CCGCGCGC	
357	GCAGCGG CUGAUGAG X CGAA AGCGCGAG		CGCGCGCT T CCGCGCGC	
358	AGCAGCG CUGAUGAG X CGAA AAGCGGAA		CGCGCGCT T CCGCGCGC	
399	UGGUGGUG CUGAUGAG X CGAA AGGCCGUC		CGCGCGCT T CCGCGCGC	
400	UGGUGGUG CUGAUGAG X CGAA AGGCCGUC		CGCGCGCT T CCGCGCGC	
420	UGGCGAGG CUGAUGAG X CGAA AGCUGCGC		CGCGCGCT T CCGCGCGC	
505	AGCAGGUG CUGAUGAG X CGAA ACCAGCAC		CGCGCGCT T CCGCGCGC	
506	CAGCAGG CUGAUGAG X CGAA AACCAGCA		CGCGCGCT T CCGCGCGC	
529	AGCACAA CUGAUGAG X CGAA AGCGCGCA		CGCGCGCT T CCGCGCGC	
531	CCAGCACA CUGAUGAG X CGAA AGAGCGCG		CGCGCGCT T CCGCGCGC	
532	ACCAGCAC CUGAUGAG X CGAA AAGAGGCG		CGCGCGCT T CCGCGCGC	
545	GCAGCUG CUGAUGAG X CGAA AGCCACCA		CGCGCGCT T CCGCGCGC	
558	ACACCUGG CUGAUGAG X CGAA AGGCGCAG		CGCGCGCT T CCGCGCGC	
582	CGAGCUGG CUGAUGAG X CGAA ACAGCGGC		CGCGCGCT T CCGCGCGC	
589	GCAGCGCC CUGAUGAG X CGAA AGCUGGUA		CGCGCGCT T CCGCGCGC	
602	CGGGCCU CUGAUGAG X CGAA AGUGGCG		CGCGCGCT T CCGCGCGC	
626	GGUCCAC CUGAUGAG X CGAA AGCGUGUG		CGCGCGCT T CCGCGCGC	
644	GCAUCCA CUGAUGAG X CGAA ACGGCUUC		CGCGCGCT T CCGCGCGC	
671	CCUGACG CUGAUGAG X CGAA AUGGUUCC		CGCGCGCT T CCGCGCGC	
676	GCCUCCU CUGAUGAG X CGAA ACGCUAUG		CGCGCGCT T CCGCGCGC	
691	CCAGGGG CUGAUGAG X CGAA ACCCGGCG		CGCGCGCT T CCGCGCGC	
749	CAACGGCA CUGAUGAG X CGAA ACUUCGGC		CGCGCGCT T CCGCGCGC	
756	UCUUGGC CUGAUGAG X CGAA ACGGCGAG		CGCGCGCT T CCGCGCGC	
808	CCUGGCC CUGAUGAG X CGAA ACGGGCGU		CGCGCGCT T CCGCGCGC	
819	GGGCCAG CUGAUGAG X CGAA ACCCGUGC		CGCGCGCT T CCGCGCGC	
863	CACACAGA CUGAUGAG X CGAA ACCACGGU		CGCGCGCT T CCGCGCGC	
864	CCACACAG CUGAUGAG X CGAA AACCCAGG		CGCGCGCT T CCGCGCGC	
865	ACCACACA CUGAUGAG X CGAA AACCCAGG		CGCGCGCT T CCGCGCGC	
876	UGGCGAGG CUGAUGAG X CGAA AACCCACA		CGCGCGCT T CCGCGCGC	

Table 13

906	CCUCCAAA	CUGAUGAG	X	CGAA	AGGUGGCU		AGCCACCT	C	TTTGGAGG	
908	ACCCUCCA	CUGAUGAG	X	CGAA	AGAGGUGG		CCACCTCT	T	TGGAGGGT	
909	CACCCUCC	CUGAUGAG	X	CGAA	AAGAGGUG		CACCTCTT	T	GGAAGGTT	
922	GUGCCAGA	CUGAUGAG	X	CGAA	AGCGCACC		GGTGGCTC	C	TCTGGCAC	
924	GCGUGCCA	CUGAUGAG	X	CGAA	AGAGCGCA		TGCGCTCT	C	TGGCACGC	
939	AUGGUGUG	CUGAUGAG	X	CGAA	AGUGGCGC		GGCGACTC	C	CCACCATC	
948	GGCCCAAG	CUGAUGAG	X	CGAA	AUGGUGUG		CCACCATC	C	CACATCGC	
981	CGAUGUG	CUGAUGAG	X	CGAA	AUGGUGG		ATCCACAT	C	GGCGCCAC	
987	GUGGCGCG	CUGAUGAG	X	CGAA	AUGGUGAU		CACCACTC	C	CCTGGGAC	
1001	GUCCACAG	CUGAUGAG	X	CGAA	ACGUGGUG		ACACGCCT	T	GTCCCCCG	
1016	CGGGGAC	CUGAUGAG	X	CGAA	AGCGUGU		CGCTTGT	C	CCCCGGTG	
1019	CACCGGGG	CUGAUGAG	X	CGAA	ACAAGGCG		CCCGTGT	A	CGCCGAGA	
1029	UCUCGGCG	CUGAUGAG	X	CGAA	ACACGGG		CAAGCACT	T	CCTCTACT	
1047	AGUAGAGG	CUGAUGAG	X	CGAA	AGUGCUUG		AAGCACTT	C	CTCTACTC	
1048	GAGUAGAG	CUGAUGAG	X	CGAA	AAGUGCUU		CACCTCTC	C	TACTCTTC	
1051	GAGGAGUA	CUGAUGAG	X	CGAA	AGGAAGUG		CTTCTCTA	A	CTCCTCAG	
1053	CUGAGGAG	CUGAUGAG	X	CGAA	AGAGGAAG		CCTCTACT	C	CTCAGGCG	
1056	CGCCUGAG	CUGAUGAG	X	CGAA	AGUAGAGG		CTACTCTC	C	AGGCGACA	
1059	UGUGCCCU	CUGAUGAG	X	CGAA	AGGAGUAG		GGCGCCCT	C	CTTCTACT	
1086	GUAGGAAG	CUGAUGAG	X	CGAA	AGGCGCGC		CGCTCTCT	T	CCTACTCA	
1089	UGAGUAGG	CUGAUGAG	X	CGAA	AGGAGGCG		CGCTCTCT	C	CTACTCAG	
1090	CUGAGUAG	CUGAUGAG	X	CGAA	AAGGAGGG		TCCTTCTA	A	CTCAGCTC	
1093	GAGCUGAG	CUGAUGAG	X	CGAA	AGGAAGGA		TTCTTACT	C	AGCTCTCT	
1096	AGAGAGCU	CUGAUGAG	X	CGAA	AGUAGGAA		ACTCAGCT	C	TCTGAGGC	
1101	GCCUCAGA	CUGAUGAG	X	CGAA	AGCUGAGU		TCAGCTCT	C	TGAGGCCC	
1103	GGGCCUCA	CUGAUGAG	X	CGAA	AGAGCUGA		CTGGGCTC	C	GGAGGCTC	
1127	GAGCCUCC	CUGAUGAG	X	CGAA	AGCGCCAG		CGGAGGCT	C	GTGGAGAC	
1135	GUCUCCAC	CUGAUGAG	X	CGAA	AGCCUCCG		GAGACCAT	C	TTTCTGGG	
1147	CCAGAAAA	CUGAUGAG	X	CGAA	AUGGUGUC		GACCATCT	T	TCTGGGTT	
1149	AACCCAGA	CUGAUGAG	X	CGAA	AGAUGGUC		ACCATCTT	T	CTGGGTTT	
1150	GAACCCAG	CUGAUGAG	X	CGAA	AAGAUGGU		CCATCTTT	C	TGGGTTCC	
1151	GAACCCCA	CUGAUGAG	X	CGAA	AAGAUGGG		TTCTGGGT	C	CGAGGCC	
1157	GGCCUGG	CUGAUGAG	X	CGAA	ACCCAGAA		TCTGGGTT	C	CAAGCCCT	
1158	AGGCGGUG	CUGAUGAG	X	CGAA	AACCCAGA		CAGGGACT	C	CCCGCAGG	
1181	CTUGCGGG	CUGAUGAG	X	CGAA	AGUCCUCC		CGCAGGTT	T	GGCCCGCC	
1191	GGCGGGCG	CUGAUGAG	X	CGAA	ACCUGGGG		CCAGCGCT	A	CTUGCAAA	
1212	UUUGCCAG	CUGAUGAG	X	CGAA	AGCGGUGG		GGCCCTGT	T	TCTGGAGC	
1233	GUCCCAGA	CUGAUGAG	X	CGAA	ACAGGGCG		CCCTGTGT	T	CTGGAGCT	
1234	AGCUCACG	CUGAUGAG	X	CGAA	AACAGGGG		CCCTGTGT	C	TGGAGCTG	
1235	CAGCUCCA	CUGAUGAG	X	CGAA	AAACAAGG		GAGCTGCT	T	GGGAACCA	
1246	UGGUUCCC	CUGAUGAG	X	CGAA	AGCAGCUC		GTGCCTCT	A	CGGGGTGC	
1269	GCACCCCG	CUGAUGAG	X	CGAA	AGGGGCAC		GGGTGCTC	C	CTCAAGAC	
1279	GUCUUGAG	CUGAUGAG	X	CGAA	AGCACCCC		GTGCTCTT	C	AAGACGCA	
1282	UGGUGUUU	CUGAUGAG	X	CGAA	AGGAGCAC		GCTGGGTT	C	ACCCGAGC	
1312	GCUGGGGU	CUGAUGAG	X	CGAA	ACCGCAGC		GGCGGTGT	C	TGTGCCCG	
1330	CGGCGACA	CUGAUGAG	X	CGAA	ACACCGGC		CCAGGGCT	C	TGTGGCGG	
1356	CCGCCACA	CUGAUGAG	X	CGAA	AGCCCUUG					

Table 13

1394	CACCAGGC	CUGAUGAG	X	CGAA	ACGGGGGU		ACCCCCGT	C	CGCTGGTG	
1411	UGCUGGCG	CUGAUGAG	X	CGAA	AGCAGCUG		CAGCTACT	C	CGCCAGCA	
1440	CGAAGCCG	CUGAUGAG	X	CGAA	ACACCTUG		GCAGGTGT	A	CGGCTTCG	
1446	CCCGCAGC	CUGAUGAG	X	CGAA	AGCCGUAC		GTACGGCT	T	CGTGGG	
1447	GCCGCGAC	CUGAUGAG	X	CGAA	AAGCGUA		TACCGCTT	C	GTGCGGCG	
1486	GAGCCCCA	CUGAUGAG	X	CGAA	AGGCCUGG		CCAGGGCT	C	TGGGGCTC	
1494	UGUGCCUG	CUGAUGAG	X	CGAA	AGCCCCAG		CTGGGGCT	C	CAGGCACA	
1515	UCCUGAGG	CUGAUGAG	X	CGAA	AGGGGGU		ACGCCGCT	T	CCTCAGGA	
1516	UCCUGAG	CUGAUGAG	X	CGAA	AAGCGGCG		CGCCGCTT	C	CTCAGGAA	
1519	GUGUCCU	CUGAUGAG	X	CGAA	AGGAAGCG		CGCTTCT	C	AGGAACAC	
1536	GGGAGAG	CUGAUGAG	X	CGAA	ACUUCUUG		CAAGAAGT	T	CATCTCCC	
1537	AGGGAGAU	CUGAUGAG	X	CGAA	AACUUCU		AAGAAGTT	C	ATCTCCCT	
1540	CCCAGGGA	CUGAUGAG	X	CGAA	AUGAACU		AAGTTTCT	C	TCCCTGGG	
1542	UCCCCAGG	CUGAUGAG	X	CGAA	AGAUGAAC		GTTTCTCT	C	CCTGGGGA	
1564	UGCAGCGA	CUGAUGAG	X	CGAA	AGCUUGGC		GCCAAAGT	C	TGCTGCA	
1566	CCUGCAGC	CUGAUGAG	X	CGAA	AGAGCUUG		CAAGCTCT	C	GCTGAGG	
1610	GCGCAGCC	CUGAUGAG	X	CGAA	AGCGCAGU		ACTGCGCT	T	GGCTGCGC	
1633	ACACAGCC	CUGAUGAG	X	CGAA	ACCCUGG		CCAGGGGT	T	GGCTGTGT	
1642	GCGGCCCG	CUGAUGAG	X	CGAA	ACACAGCC		GGCTGTGT	T	CCGSCGCG	
1643	UGCGGCCG	CUGAUGAG	X	CGAA	AACACAGC		GCTGTGTT	C	CGGCCGCA	
1661	CUCACGCA	CUGAUGAG	X	CGAA	ACGGUGCU		AGCACCGT	C	TGCGTOAG	
1675	UUGGCCAG	CUGAUGAG	X	CGAA	AUUCUCC		GAGGAGAT	C	CTGGCCAA	
1686	AGUGCAGG	CUGAUGAG	X	CGAA	ACUUGGCC		GGCCAGT	T	CTGCACT	
1687	CAGUGCAG	CUGAUGAG	X	CGAA	AACUUGGC		GCCAAAGT	C	CTGCACTG	
1710	CGACGACG	CUGAUGAG	X	CGAA	ACACACUC		GAGTGTGT	A	CGTCGTCG	
1714	AGCUCGAC	CUGAUGAG	X	CGAA	ACGUACAC		GTGTACGT	C	GTGAGCT	
1717	AGCAGCUC	CUGAUGAG	X	CGAA	ACGACGUA		TACGTGCT	C	GAGCTGCT	
1726	AAAGACCU	CUGAUGAG	X	CGAA	AGCAGCUC		GAGCTGCT	C	AGGTCTTT	
1731	AAAAGAAA	CUGAUGAG	X	CGAA	ACCUGAGC		GCTCAGGT	C	TTTCTTTT	
1733	AUAAAAGA	CUGAUGAG	X	CGAA	AGACCUGA		TCAGGTCT	T	TCTTTTAT	
1734	CAUAAAAG	CUGAUGAG	X	CGAA	AAGACCU		CAGGTCTT	T	CTTTTATG	
1735	ACAUAAA	CUGAUGAG	X	CGAA	AAAGACCU		AGGTCTCT	C	TTTTATGT	
1737	UGACAUAA	CUGAUGAG	X	CGAA	AGAAAGAC		GTCTTTCT	T	TTATOTCA	
1738	GUGACAU	CUGAUGAG	X	CGAA	AAGAAAGA		TCTTTCTT	T	TATGTCAC	
1739	CGUGACAU	CUGAUGAG	X	CGAA	AAAGAAAG		CTTTCTTT	T	ATGTCAAG	
1740	CCGUGACA	CUGAUGAG	X	CGAA	AAAAGAAA		TTTCTTTT	A	TGTACCGG	
1744	GUCUCCGU	CUGAUGAG	X	CGAA	ACAUAAAA		TTTTATGT	C	ACGGAGAC	
1758	UCUUGUGA	CUGAUGAG	X	CGAA	ACGUGGUC		GACCAGGT	T	TCAAAGAA	
1759	UUCUUGUG	CUGAUGAG	X	CGAA	AACGUGGU		ACCAGGTT	T	CAAAAGAA	
1760	GUUCUUGU	CUGAUGAG	X	CGAA	AAACGUGG		CCACGTTT	C	AAAAGAAC	
1774	UAGAAAAA	CUGAUGAG	X	CGAA	AGCCUGUU		AACAGGCT	C	TTTTTCTA	
1776	GGUAGAAA	CUGAUGAG	X	CGAA	AGAGCCUG		CAGGCTCT	T	TTTCTACC	
1777	CGGUGAAA	CUGAUGAG	X	CGAA	AAGAGCCU		AGGCTCTT	T	TTTCTACC	
1778	CCGUGAGA	CUGAUGAG	X	CGAA	AAAGAGCC		GGCTCTTT	T	TCTACCGG	
1779	UCCGUGAG	CUGAUGAG	X	CGAA	AAAGAGCC		GCTCTTTT	T	CTACCGGA	
1780	UUCCGGUA	CUGAUGAG	X	CGAA	AAAAGAGG		CTCTTTTT	C	TACCGGAA	
1782	UCUCCGG	CUGAUGAG	X	CGAA	AGAAAAAG		CTTTTCTT	A	CCGGAGAA	

Table 13

1795	UUGCUCCA	CUGAUGAG	X	CGAA	ACACUCUU		AAGAGTGT	C TGGAGCAA	
1806	UGCUUJGC	CUGAUGAG	X	CGAA	ACUUGCUC		GAGCAAGT	T GCRAAGCA	
1816	CUGAUUCC	CUGAUGAG	X	CGAA	AUGCUUUG		CAUAGCAT	T GGAATCAG	
1822	UGCUGUCU	CUGAUGAG	X	CGAA	AUUCUAAU		ATTGGAAAT	C AGACAGCA	
1833	CCCUUCUC	CUGAUGAG	X	CGAA	AGUGCUGU		ACAGCACT	T GAAAGAGG	
1860	CUGCUUCC	CUGAUGAG	X	CGAA	ACAGCUCC		GGAGCTGT	C GGAAGCAG	
1873	UGCUGCCU	CUGAUGAG	X	CGAA	ACCUUCGC		GCAGAGGT	C AGGCAGCA	
1883	GGCUUCCC	CUGAUGAG	X	CGAA	AUGCUGCC		GGCAGCAT	C GGGAGGCC	
1911	GGAGUCUG	CUGAUGAG	X	CGAA	ACGUCAGC		GCTGACGT	C CAGACTCC	
1918	AUGAAGCG	CUGAUGAG	X	CGAA	AGUCUGGA		TCCAGACT	C CGCTTCAT	
1923	UGGGGAUG	CUGAUGAG	X	CGAA	AGCGGAGU		ACTCCGCT	T CATCCCCA	
1924	UUGGGGAU	CUGAUGAG	X	CGAA	AAGCGGAG		CTCCGCTT	C ATCCCCAA	
1927	GGCUU99G	CUGAUGAG	X	CGAA	AUGAAGCG		CGCTTCAT	C CCGAAGCC	
1954	AUGUUCAC	CUGAUGAG	X	CGAA	AUCGCGCG		CGCCCGAT	T GTGAACAT	
1968	CCACGACG	CUGAUGAG	X	CGAA	AGUCAAGU		CATGGAGT	A CGTCGTGG	
1972	GCUCCCAC	CUGAUGAG	X	CGAA	ACGUAGUC		GACTAGCT	C GTGGGAGC	
1989	CUCUGCGG	CUGAUGAG	X	CGAA	ACGUUCUG		CAGAACGT	T CCGCAGAG	
1990	UCUCUGCG	CUGAUGAG	X	CGAA	AACGUUCU		AGAACGTT	C CGCAGAGA	
2015	CGAGGUGA	CUGAUGAG	X	CGAA	ACGUCGGG		CCGAGGCT	C TCACCTCG	
2017	CUCGAGGU	CUGAUGAG	X	CGAA	AGACGCUC		GAGCGTCT	C ACCTCGAG	
2022	UCACCCUC	CUGAUGAG	X	CGAA	AGGUGAGA		TCTCACCT	C GAGGCTGA	
2040	GCACGCGU	CUGAUGAG	X	CGAA	ACAGUGCC		GGCACTGT	T CAGCGTGC	
2041	AGCAGCGU	CUGAUGAG	X	CGAA	AACAGUGC		GCACCTGT	C AGCGTCT	
2050	UCGUAGUU	CUGAUGAG	X	CGAA	AGCAGCGU		AGCGTGCT	C AACTACGA	
2055	CCCGUCUG	CUGAUGAG	X	CGAA	AGUUGAGC		GCTCAACT	A CGAGCGGG	
2080	GCGCCCAG	CUGAUGAG	X	CGAA	AGGCCGGG		CCGGCGCT	C CTGGCGCG	
2091	CCAGCACG	CUGAUGAG	X	CGAA	AGGCCGCC		GGCGCCTT	C GTGTCTGG	
2111	CCUGUGGA	CUGAUGAG	X	CGAA	AUCGUCCA		TGGACCAT	A TCCACAGG	
2113	GCCUCUGG	CUGAUGAG	X	CGAA	AUACGUGC		GACGATAT	C CACAGGCG	
2133	GCACGACG	CUGAUGAG	X	CGAA	AGGUGCGC		GGCAGCCT	T CGTGCTGC	
2134	CGCAGCAC	CUGAUGAG	X	CGAA	AAGGUGCG		CGCACCTT	C GTGCTGCG	
2175	UGACAAAG	CUGAUGAG	X	CGAA	ACAGCUCU		TGAGCTGT	A CTTTGTCA	
2178	CCUGACAC	CUGAUGAG	X	CGAA	AGUACAGC		GCTGTACT	T GTCAAGG	
2179	ACCUUGAC	CUGAUGAG	X	CGAA	AAGUACAG		CTGTACTT	T GTCAAGGT	
2182	UCCACCUU	CUGAUGAG	X	CGAA	ACAAAGUA		TACTTTGT	C AAGGTGGA	
2205	UGGUGUGG	CUGAUGAG	X	CGAA	ACGCGCCC		GGGCGCCT	A CGACACCA	
2215	UCCUGGGG	CUGAUGAG	X	CGAA	AUGGUGUC		GACACCAT	C CCCCAGGA	
2230	ACCUCCGU	CUGAUGAG	X	CGAA	AGCCUGUC		GACAGGCT	C ACAGAGGT	
2239	CUGGCGAU	CUGAUGAG	X	CGAA	ACCUCCGU		ACGAGAGT	C ATGCGCAG	
2242	AUGCUGGC	CUGAUGAG	X	CGAA	AUGACCUC		GAGGTCTAT	C GCCAGCAT	
2251	GGUUGAUU	CUGAUGAG	X	CGAA	AUGCUGGC		GCCAGCAT	C ATCAAACC	
2254	UGGGGJUU	CUGAUGAG	X	CGAA	AUGAUGCU		AGCATCAT	C AAACCCCA	
2271	GCACGCAG	CUGAUGAG	X	CGAA	ACGUGUUC		GAACACGT	A CTGCGTGC	
2282	GGCAUACC	CUGAUGAG	X	CGAA	ACGCACGC		GCGTGCGT	C GGTATGCC	
2286	CCACGGCA	CUGAUGAG	X	CGAA	ACCGACGC		GCCTCGGT	A TGCCGTGG	
2296	GCCUUCUG	CUGAUGAG	X	CGAA	ACCACGCG		GCCTGTGT	C CAGAAGGC	
2320	GCCUUGCG	CUGAUGAG	X	CGAA	ACGUGCCC		GGGCAAGT	C CCGAAGGC	

Table 13

2331	GGCUCUUG	CUGAUGAG	X	CGAA	AGGCCUUG		CAAGGCCT	T	CAAGAGCC	
2332	UGGCUCUU	CUGAUGAG	X	CGAA	AGGCCUUU		AAGGCCTT	C	AAGAGCCA	
2344	AAGGUAGA	CUGAUGAG	X	CGAA	ACGUGGCU		AGCCACGT	C	TCTACCTT	
2346	UCRAAGGUA	CUGAUGAG	X	CGAA	AGACGUGG		CCAGCTCT	C	TACCTTGA	
2348	UGUCAAGG	CUGAUGAG	X	CGAA	AGAGACGU		ACGTCTCT	A	CTTTGACA	
2352	GGUCUGUC	CUGAUGAG	X	CGAA	AGGUAGAG		CTCTACCT	T	GACAGACC	
2362	UACGGCUG	CUGAUGAG	X	CGAA	AGGUCUGU		ACAGACCT	C	CAGCGGTA	
2370	GUCCGCAUG	CUGAUGAG	X	CGAA	ACGGCUGG		CCAGCCGT	A	CATGCGAC	
2382	GAGCCACG	CUGAUGAG	X	CGAA	ACUGUCGC		GCGACAGT	T	CGTGGCTC	
2383	UGAGCCAC	CUGAUGAG	X	CGAA	AACUGUCG		CGACAGTT	C	GTGGCTCA	
2390	CUGCAGGU	CUGAUGAG	X	CGAA	AGCCACGA		TCGTGGCT	C	ACCTGCAG	
2425	UCGAUGAC	CUGAUGAG	X	CGAA	ACGGCAUC		GATGCGGT	C	GTCTATCGA	
2428	UGCUCGAU	CUGAUGAG	X	CGAA	ACGACGGC		GCGGTGCT	C	ATCGAGCA	
2431	CUCUGCUC	CUGAUGAG	X	CGAA	AUGACGAC		GTGTCTAT	C	GAGCAGAG	
2442	UCAGGGAG	CUGAUGAG	X	CGAA	AGCUCUGC		GCAGAGCT	C	CTCCCTGA	
2445	CAUUCAGG	CUGAUGAG	X	CGAA	AGGAGCUC		GAGCTCCT	C	CTGGAATG	
2470	ACGUCGAA	CUGAUGAG	X	CGAA	AGGCCACU		AGTGGCTC	C	TTGACGCT	
2472	AGACGUUG	CUGAUGAG	X	CGAA	AGAGGCCA		TGGCTCTT	T	CGAGCTCT	
2473	AAGACGUC	CUGAUGAG	X	CGAA	AAGAGGCC		GGCTCTTT	C	GACGTCTT	
2479	CGUAGGAA	CUGAUGAG	X	CGAA	ACGUCGAA		TTCCAGCT	C	TTCTACAG	
2481	AGCGUAGG	CUGAUGAG	X	CGAA	AGACGUCG		CGAGCTCT	C	CTACGCTT	
2482	AAGCGUAG	CUGAUGAG	X	CGAA	AAGACGUC		GACGTCTT	C	CTACGCTT	
2485	AUGAAGCG	CUGAUGAG	X	CGAA	AGGAGACG		GTCTCTCT	A	CGCTTATC	
2490	GGCACAUG	CUGAUGAG	X	CGAA	AGCGUAGG		CCTACGCT	T	CATGTGCC	
2491	UGGCACAU	CUGAUGAG	X	CGAA	AAGCGUAG		CTACGCTT	C	ATGTGCCA	
2515	UUGCCCCU	CUGAUGAG	X	CGAA	AUGCGCAC		GTGGCGAT	C	AGGGGCAA	
2526	GGACGUAG	CUGAUGAG	X	CGAA	ACUUGCCC		GGGCAAGT	C	CTACGTCC	
2529	ACUGGACG	CUGAUGAG	X	CGAA	AGGACUUG		CAAGTCTT	A	CGTCCAGT	
2533	UGGCACUG	CUGAUGAG	X	CGAA	ACGUAGGA		TCCTACGT	C	CAGTGCCA	
2548	CCUUGCGG	CUGAUGAG	X	CGAA	AUCCCCUG		CAGGGGAT	C	CCGCAAGG	
2559	AGAGGAUG	CUGAUGAG	X	CGAA	AGCCCCUG		GCAGGGCT	C	CATCCTCT	
2563	GUGGAGAG	CUGAUGAG	X	CGAA	AUGGAGCC		GGCTCCAT	C	CTCTCCAC	
2566	AGCGUGGA	CUGAUGAG	X	CGAA	AGGAUGGA		TCCATCCT	C	TCCAGGCT	
2568	GCAGCGUG	CUGAUGAG	X	CGAA	AGAGGAUG		CATCCTCT	C	CAGGCTGC	
2578	AGGCGUCA	CUGAUGAG	X	CGAA	AGCAGCGU		ACGTGTCT	C	TGCAGGCT	
2592	UGUCGCGG	CUGAUGAG	X	CGAA	AGCAGAGG		CCTGTGCT	A	CGGCGACA	
2616	UCCCCGCA	CUGAUGAG	X	CGAA	ACAGCUUG		CAAGCTGT	T	TGCGGGGA	
2617	AUCCCCGC	CUGAUGAG	X	CGAA	AACAGCUU		AAGCTGTT	T	GCGGGGAT	
2626	UCCGCGCG	CUGAUGAG	X	CGAA	AUCCCCGC		GCGGGGAT	T	GCGGGGGA	
2627	GUCCCCGC	CUGAUGAG	X	CGAA	AUCCCCGC		CGGGGATT	C	GCGGGGAC	
2644	AAACGCGG	CUGAUGAG	X	CGAA	AGCAGCCC		GGGCTGCT	C	CTGCGTTT	
2651	AUCCACCA	CUGAUGAG	X	CGAA	ACGCAGGA		TCCTGCGT	T	TGTTGGAT	
2652	CAUCCACC	CUGAUGAG	X	CGAA	AACGCAGG		CCTGCGTT	T	GTTGGATG	
2663	CAACAAGA	CUGAUGAG	X	CGAA	AUCAUCCA		TGGATGAT	T	CTTTGTTG	
2664	CCAACAAG	CUGAUGAG	X	CGAA	AAUCAUCC		GGATGATT	T	CTTTGTTG	
2665	ACCAACAA	CUGAUGAG	X	CGAA	AAUCAUCC		GATGATTT	C	TTGTTGGT	
2667	UCACCAC	CUGAUGAG	X	CGAA	AGAAAUCA		TGATTTCT	T	GTTGGTGA	

Table 13

2670	GUGUCACC	CUGAUGAG	X	CGAA	ACAAGAAA		TTTCTTGT	T GGTGACAC	
2681	GGUGAGGU	CUGAUGAG	X	CGAA	AGGUGUCA		TGACACCT	C ACCTCACC	
2686	GCGUGGGU	CUGAUGAG	X	CGAA	AGGUGAGG		CCTCAACT	C ACCCAGCG	
2703	UCCUGAGG	CUGAUGAG	X	CGAA	AGGUUUUC		GAAGAACT	T CCTCAGGA	
2704	GUCCUGAG	CUGAUGAG	X	CGAA	AAGGUUUU		AAACCTT	C CTCAGGAC	
2707	AGGUUCU	CUGAUGAG	X	CGAA	AGGAAGGU		ACCTTCTT	C AGGACCTT	
2719	ACACUUCG	CUGAUGAG	X	CGAA	ACCAGGGU		ACCTCTGT	C CGAGTGT	
2728	UACUCAGG	CUGAUGAG	X	CGAA	ACACCUCG		CGAGGTGT	C CCTGAGTA	
2736	CGCAGCCA	CUGAUGAG	X	CGAA	ACUCAGGG		CCCTGAGT	A TGGCTGCG	
2754	UCUUCGCG	CUGAUGAG	X	CGAA	AGUUCACC		GGTGAAC	T GCGGAAGA	
2775	CUACAGGG	CUGAUGAG	X	CGAA	AGUUCACC		GGTGAAC	T CCTGTAG	
2776	UCUACAGG	CUGAUGAG	X	CGAA	AAGUUCAC		GTGACTT	C CCTGTAGA	
2782	UCGUUCUC	CUGAUGAG	X	CGAA	ACAGGGAA		TTCCCTGT	A GAAGACGA	
2810	CUGAACAA	CUGAUGAG	X	CGAA	AGCCGUGC		GCACGGCT	T TTGTTCAG	
2811	UCUGAACA	CUGAUGAG	X	CGAA	AAGCCGUG		CACGGCTT	T TGTTTCAGA	
2812	AUCUGAAC	CUGAUGAG	X	CGAA	AAGCCGCU		ACGGCTTT	T GTTCAGAT	
2815	GGCAUCUG	CUGAUGAG	X	CGAA	ACAAAAGC		GCTTTTGT	T CAGATGCC	
2816	CGGCAUCU	CUGAUGAG	X	CGAA	AACAAAAG		CTTTTGT	C AGATGCCG	
2836	CAGGGGAA	CUGAUGAG	X	CGAA	AGCCCGUG		CACGGCTT	A TTCCCTGT	
2838	ACCAGGGG	CUGAUGAG	X	CGAA	AUAGCCCG		CGGCTAT	T CCCCTGGT	
2839	CACCAGGG	CUGAUGAG	X	CGAA	AUAGGCC		GGCTATT	C CCTCTGGT	
2864	GGUCCGGG	CUGAUGAG	X	CGAA	AUCCAGCA		TGCTGTAT	A CCGGACC	
2892	AGCUGGAG	CUGAUGAG	X	CGAA	AGUCGCUC		GAGCGACT	A CTCAGACT	
2895	CAUAGCUG	CUGAUGAG	X	CGAA	AGUAGUCG		CGACTACT	C CAGCTATG	
2901	UCGGGGCA	CUGAUGAG	X	CGAA	AGCUGGAG		CTCCAGCT	A TGCCCGGA	
2913	CUCUGAUG	CUGAUGAG	X	CGAA	AGGUCCGG		CGGGAGCT	C CATCAGAG	
2917	GUGGUCUC	CUGAUGAG	X	CGAA	AUGGAGGU		ACCTCCAT	C AGAGCCAG	
2927	GAGGGUGA	CUGAUGAG	X	CGAA	ACUUGCUC		GAGCCAGT	C TCACCTTC	
2929	UUGAAGGU	CUGAUGAG	X	CGAA	AGACUGGC		GCCAGTCT	C ACCTTCAA	
2934	CGCGGUUG	CUGAUGAG	X	CGAA	AGGUGAGA		TCTCAACT	T CAACCGG	
2935	CCGCGGUU	CUGAUGAG	X	CGAA	AAGGUGAG		CTCACCTT	C AACCGCGG	
2946	CAGCCUUG	CUGAUGAG	X	CGAA	AGCCCGGG		CCGCGGCT	T CAAGGCTG	
2947	CCAGCCUU	CUGAUGAG	X	CGAA	AAGCCGCG		CGCGGCTT	C AAGGCTGG	
2969	GAGUUUGC	CUGAUGAG	X	CGAA	ACGCAUGU		ACATGGCT	C GCAAACTC	
2977	ACCCCAAA	CUGAUGAG	X	CGAA	AGUUUGCG		CGCAAACT	C TTGTTGGT	
2979	AGACCCCA	CUGAUGAG	X	CGAA	AGAGUUUG		CAAACTCT	T TGGGTCTT	
2980	AAGACCCC	CUGAUGAG	X	CGAA	AAGAGUUU		AAACTCTT	T GGGGTCTT	
2986	AGCCGCAA	CUGAUGAG	X	CGAA	ACCCCAAA		TTTGGGGT	C TTGCGGCT	
2988	UCAGCCGC	CUGAUGAG	X	CGAA	AGACCCCA		TGGGTCTT	T GCGGCTGA	
3002	CAGGCUUG	CUGAUGAG	X	CGAA	ACACUUCA		TGAAGTGT	C ACAGCCTG	
3012	AAUCCAGA	CUGAUGAG	X	CGAA	ACAGGCUG		CAGCCTGT	T TCTGGATT	
3013	AAAUCCAG	CUGAUGAG	X	CGAA	AACAGGCU		AGCCTGT	T CTGGATT	
3014	CAAAUCCA	CUGAUGAG	X	CGAA	AAACAGGC		GCCTGT	T TGTGATT	
3020	CACCUJCA	CUGAUGAG	X	CGAA	AUCCAGAA		TTCTGGAT	T TGCAGGTG	
3021	UCACCUJG	CUGAUGAG	X	CGAA	AAUCCAGA		TCTGGATT	T GCAGGTGA	
3037	ACCGUCUG	CUGAUGAG	X	CGAA	AGGCUUGU		AACAGCCT	C CAGACGGT	
3058	AUCUJGUA	CUGAUGAG	X	CGAA	AUGUUGGU		ACCAACAT	C TACAAGAT	

Table 13

3060	GGAUUUG CUGAUGAG X CGAA AGAUGUG	CAACATCT A CAAGATCC
3067	AGCAGGAG CUGAUGAG X CGAA AUCUUGUA	TACAAGAT C CTCCTGCT
3070	UGCAGCAG CUGAUGAG X CGAA AGGAUUCU	AAGATCCT C CTGCTGCA
3084	GAACCCUG CUGAUGAG X CGAA ACCCGGCG	GCAGGCGT A CAGGTTTC
3090	AUGCGUGA CUGAUGAG X CGAA ACCUGUAC	GTACAGGT T TCACGCAT
3091	CAUGCGUG CUGAUGAG X CGAA AACCGUGA	TACAGGTT T CACGCATG
3092	ACAUCCGU CUGAUGAG X CGAA AACCCUGU	ACAGGTTT C ACCCATGT
3112	UGAAUUGG CUGAUGAG X CGAA AGCUGCAG	CTGCAGCT C CCATTTCA
3117	GCUGAUGA CUGAUGAG X CGAA AUGGGAGC	GCTCCCAT T TCATCAGC
3118	UGCUGAUG CUGAUGAG X CGAA AAUGGGAG	CTCCCAT T CATCAGCA
3119	UUGCUGAU CUGAUGAG X CGAA AAUUGGGA	TCCCATTT C ATCAGCA
3122	AACUUGCU CUGAUGAG X CGAA AUGAAUUG	CATTTCAT C AGCAAGTT
3130	UUCUCCCA CUGAUGAG X CGAA ACUCUGUG	CAGCAAGT T TGAAGAA
3131	GUUCUCC CUGAUGAG X CGAA AACUUGCU	AGCAAGTT T GGAAGAAC
3147	GCAGGAAA CUGAUGAG X CGAA AUGUGGGG	CCCCACAT T TTCTCTGC
3148	CGCAGGAA CUGAUGAG X CGAA AAUGUGGG	CCACATT T TTCTCTGC
3149	CGCAGGAA CUGAUGAG X CGAA AAUUGUGG	CCACATT T TTCTCTGC
3150	CGCAGGAG CUGAUGAG X CGAA AAAAUGUG	CACATTTT T CTTCTCTGC
3151	ACGCGCAG CUGAUGAG X CGAA AAAAUGUG	CACATTTT C CTGCGCGT
3160	UCAGAGAU CUGAUGAG X CGAA ACGCGCAG	CTGCGCGT C ATCTCTGA
3163	GUGUCAGA CUGAUGAG X CGAA AUGACGCG	CGCGTCAT C TCTGACAC
3165	CCGUGUCA CUGAUGAG X CGAA AGAUGACG	CGTCATCT C TGACACGG
3177	AGCAGAGG CUGAUGAG X CGAA AGCCCGUG	CACGCGCT C CCTCTGCT
3181	GAGUAGCA CUGAUGAG X CGAA AGGAGGCG	GCCTCCCT C TGTACTC
3186	GGAUGGAG CUGAUGAG X CGAA AGCAGAGG	CCTCTGCT A CTCATCC
3189	UCAGGAUG CUGAUGAG X CGAA AGUAGCAG	CTGCTACT C CATCTGA
3193	GCUUUACG CUGAUGAG X CGAA AUGGAGUA	TACTCCAT C CTGAAAGC
3219	CCCCCAGC CUGAUGAG X CGAA ACAUCCCU	AGGGATGT C GCTGGGGG
3248	GGAGGGCA CUGAUGAG X CGAA AGGCCGGG	CCGGCCCT C TGCCCTCC
3255	CGGCCUUG CUGAUGAG X CGAA AGGCCAGA	TCTGCCCT C AGAGGCCG
3288	UGAGCAGG CUGAUGAG X CGAA AUGCUUGG	CCAAGCAT T CTTGCTCA
3289	UUGAGCAG CUGAUGAG X CGAA AAUGCUUG	CAAGCAT T CTGCTCAA
3295	GUCAGCUU CUGAUGAG X CGAA AGCAGGAA	TTCTGCT C AAGCTGAC
3305	ACGUGGUC CUGAUGAG X CGAA AGUCAGCU	AGCTGACT C GACACCGT
3316	ACGUAGGU CUGAUGAG X CGAA ACACGGUG	CACCGTGT C ACCTACGT
3321	GUGGCACG CUGAUGAG X CGAA AGGUGACA	TGTACCAT A COTGCCAC
3331	GACCCAG CUGAUGAG X CGAA AGUGGCAC	GTGCCACT C CTGGGGTC
3339	UCCUGAGU CUGAUGAG X CGAA ACCCCAGG	CTGGGGT C ACTCAGGA
3343	GCUGUCCU CUGAUGAG X CGAA AGUGACCC	GGTTCAT C AGGACAGC
3368	GAGCUUCC CUGAUGAG X CGAA ACUCAGCU	AGCTGAGT C GGAAGCTC
3376	GUCCCCGG CUGAUGAG X CGAA AGCUUCCG	CGGAAGCT C CCGGGGAC
3429	UGAAGUCU CUGAUGAG X CGAA AGGCCAGU	ACTGCCCT C AGACTTCA
3435	UGGUCUUG CUGAUGAG X CGAA AGUCUGAG	CTCAGACT T CAGAGCCA
3436	AUGGUCUU CUGAUGAG X CGAA AAGUCUGA	TCAGACTT C AAGACCAT
3445	CAGUCCAG CUGAUGAG X CGAA AUGGUCUU	AAGACCAT C CTGAGCTG
3503	CCCGCGU CUGAUGAG X CGAA ACAGGGCU	AGCCCTGT C AGCCCGGG
3514	GCGACGUA CUGAUGAG X CGAA AGCCCGGC	GCCGGGCT C TACGTCCC

Table 13

3516	CUGGGACG	CUGAUGAG	X	CGAA	AGAGCCCG		CGGGCTCT	A	GCTCCAG	
3520	CUCCCUUG	CUGAUGAG	X	CGAA	ACGUAGAG		CTCTAGTG	C	CCAGGGAG	
3568	AGGCCUCA	CUGAUGAG	X	CGAA	ACUCCAG		CTGGGAGT	C	TGAGGCTT	
3587	CUCGGCCA	CUGAUGAG	X	CGAA	ACACUCAC		GTGAGTGT	T	TGGCGAG	
3588	CCUCGGCC	CUGAUGAG	X	CGAA	AACACUCA		TGAGTGTT	T	GGCGAGG	
3606	UUCAGCCG	CUGAUGAG	X	CGAA	ACAUCCAG		CTGATGAT	C	CGGCTGAA	
3625	CUCAGCCG	CUGAUGAG	X	CGAA	ACACUCAG		CTGAGTGT	C	GGGCTGAG	
3648	CUUGGCTG	CUGAUGAG	X	CGAA	ACACUCGC		GGCAGTGT	C	CAGCCAAG	
3667	GUGGCTUG	CUGAUGAG	X	CGAA	ACACUCAG		CTGAGTGT	C	CAGCACAC	
3683	GAAGUGAA	CUGAUGAG	X	CGAA	ACGGCAGG		CCTGCCGT	C	TTCACCTT	
3685	GGGAAGUG	CUGAUGAG	X	CGAA	AGACGGCA		TGCCGTCT	T	CACCTCCC	
3686	GGGGAAGU	CUGAUGAG	X	CGAA	AGACGGC		GGCGTCTT	C	ACTTCCCC	
3690	CUGUGGGG	CUGAUGAG	X	CGAA	AGUGAAGA		TCTTCACT	T	CCCCACAG	
3691	CCUGUGGG	CUGAUGAG	X	CGAA	AGUGAAG		CTTCACTT	C	CCCCACAG	
3708	GUGGAGCC	CUGAUGAG	X	CGAA	AGGCCAG		CTGGCGCT	C	GGCTCCAC	
3713	CUGGGGUG	CUGAUGAG	X	CGAA	AGCCGAGC		GCTCGGCT	C	CACCCACG	
3730	GUGAGGAA	CUGAUGAG	X	CGAA	AGCUGGCC		GGCCAGCT	T	TTCCTCAC	
3731	GGUGAGGA	CUGAUGAG	X	CGAA	AAGCUGGC		GCAGCTTT	T	TGCTCACC	
3732	UGGUGAGG	CUGAUGAG	X	CGAA	AAGCUGG		CCAAGCTT	T	CTCCACCA	
3733	CUGGUGAG	CUGAUGAG	X	CGAA	AAAGCUG		CAGCTTTT	C	CTCACCAG	
3736	CUCCUGGU	CUGAUGAG	X	CGAA	AGGAAAAG		CTTTTCCT	C	ACCAGGAG	
3752	GGGAGUGG	CUGAUGAG	X	CGAA	AGCCGGGC		GGCCGGCT	T	CCACTCCC	
3753	GGGAGUGG	CUGAUGAG	X	CGAA	AGCCGGG		CCCGGCTT	C	CACCTCCC	
3758	UAUGUGGG	CUGAUGAG	X	CGAA	AGUGGAAG		CTTCCACT	C	CCCCACATA	
3766	ACUAIUCC	CUGAUGAG	X	CGAA	AUGUGGGG		CCCCACAT	A	GGAAATAGT	
3772	GGAUGGAC	CUGAUGAG	X	CGAA	AUUCUUAU		ATAGGAAT	A	GTCCATCC	
3775	UGGGGAGU	CUGAUGAG	X	CGAA	ACUAIUCC		GGAAATAG	C	CATCCUCA	
3779	AAUCUGGG	CUGAUGAG	X	CGAA	AUGGACUA		TAGTCCAT	C	CCCAGATT	
3787	CAUUGGCG	CUGAUGAG	X	CGAA	AUCUGGGG		CCCCAGAT	T	CGCCATTG	
3788	ACAAUGGC	CUGAUGAG	X	CGAA	AUCUGGG		CCCAGATT	C	GCCATTGT	
3794	GGUUGAAC	CUGAUGAG	X	CGAA	AUGGCGAA		TTCGCCAT	T	GTTACACC	
3797	GAGGGGUG	CUGAUGAG	X	CGAA	ACAAUGGC		GCCATTGT	T	CACCCCTC	
3798	CGAGGGGU	CUGAUGAG	X	CGAA	AACAUGGC		CCATTGTT	C	ACCCCTCG	
3805	GGCAGGGC	CUGAUGAG	X	CGAA	AGGGGUGA		TCACCCCT	C	GGCCTGCC	
3816	AGGCAAG	CUGAUGAG	X	CGAA	AGGGCAGG		CCTGCCCT	C	CTTTGCTT	
3819	GGAGGGCA	CUGAUGAG	X	CGAA	AGGAGGGC		GGCCTCCT	T	TGCTTCCC	
3820	UGGAAGGC	CUGAUGAG	X	CGAA	AAGGAGGG		CCCTCCTT	T	GCCTTCCA	
3825	GGGGGUGG	CUGAUGAG	X	CGAA	AGGCAAG		CTTTGCTT	T	CCACCCCC	
3826	UGGGGGUG	CUGAUGAG	X	CGAA	AAGGCATA		TTTGCTTT	C	CACCCCCA	
3839	UCCACCUG	CUGAUGAG	X	CGAA	AUGGUGGG		CCCACCAT	C	CAGGTGGA	
3873	AAUUCCCA	CUGAUGAG	X	CGAA	AGCUCCCA		TGGGAGCT	C	TGGGAATT	
3881	UCACUCCA	CUGAUGAG	X	CGAA	AUUCGCCA		CTGGGAAT	T	TGGAGTGA	
3882	GUCACUCC	CUGAUGAG	X	CGAA	AAUUCCCA		TGGGAATT	T	GGAGTGAC	
3907	GCCTCUGG	CUGAUGAG	X	CGAA	ACAGGGCA		TGCCCTGT	A	CACAGGGC	
3940	CCCACAGG	CUGAUGAG	X	CGAA	ACCCCAU		ATGGGGGT	C	CCTGTGGG	
3950	CCCAAUUU	CUGAUGAG	X	CGAA	ACCCACAG		CTGTGGGT	C	AAATTGGG	
3955	CUCCCCC	CUGAUGAG	X	CGAA	AUUUGACC		GGTCAAA	T	GGGGGAG	

Table 13

3977	CAGUAIUU	CUGAUGAG	X	CGAA	ACUCCAC		GTGGCAGT	A	AAATATG	
3982	AUAUUCAG	CUGAUGAG	X	CGAA	AUUUUACU		AGTAAAT	A	CTGAATAT	
3989	AACUCAUA	CUGAUGAG	X	CGAA	AUUCAGUA		TACTCAAT	A	TATGAGTT	
3991	AAAACUCA	CUGAUGAG	X	CGAA	AUAUUCAG		CTGAATAT	A	TCAGTTT	
3997	AACUGAAA	CUGAUGAG	X	CGAA	ACUCAUAU		ATATGAGT	T	TTTCAGTT	
3998	AAACUGAA	CUGAUGAG	X	CGAA	AAACUCAU		TATGAGTT	T	TTTCAGTTT	
3999	AAAACUGA	CUGAUGAG	X	CGAA	AAACUCAU		ATGAGTTT	T	TCAGTTT	
4000	CAAAACUG	CUGAUGAG	X	CGAA	AAAACUCA		TGAGTTT	T	CAGTTT	
4001	UCAAACU	CUGAUGAG	X	CGAA	AAAACUC		GAGTTT	T	CAGTTT	
4005	UUUUUCAA	CUGAUGAG	X	CGAA	ACUGAAAA		TTTTTCAGT	T	TGAAAAA	
4006	UUUUUUA	CUGAUGAG	X	CGAA	AACUGAAA		TTTCAGTT	T	TGAAAAA	
4007	UUUUUUUC	CUGAUGAG	X	CGAA	AAACUGAA		TTTCAGTT	T	GAAAAAA	

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II sequence and length (greater than or equal to 2 base-pairs))

Seq1 = TERT (Homo sapiens telomerase reverse transcriptase (TERT) mRNA, 4015 bp; Nakamura *et al.*, Science 277 (5328), 955-959 (1997))

Table 14

Table 14: Human telomerase reverse transcriptase (TERT) NCH Ribozyme and Target Sequence

nt. Position	Ribozyme Sequence	Seq ID Nos	Substrate Sequence	Seq ID Nos
14	GCOCAGCA CUGAUGAG X CGAA IACGCAGC		GCTGCGTC C TGCTGCGC	
15	UGCGCAGC CUGAUGAG X CGAA IGACGCAG		CTGCGTCC T GCTGC3CA	
18	ACGUGCGC CUGAUGAG X CGAA ICAGGACG		CGTCTGCT T GCGCAGCT	
23	UUCCCACG CUGAUGAG X CGAA ICGCAGCA		TGCTGCGC A CGTGGGAA	
34	GGGCGCAG CUGAUGAG X CGAA ICUUCCCA		TG3GAAGC C CTGGCCCC	
35	CGGGGCCA CUGAUGAG X CGAA TGUUCC		GGGAAGCC C TG9CCCCG	
36	CCGGGGCC CUGAUGAG X CGAA TGGUUC		GGAAGCCC T G3CCCCGG	
40	GUGGCCGG CUGAUGAG X CGAA TCCAGGGC		GCCT3GC C CGGCCAC	
41	GGUGCCG CUGAUGAG X CGAA TGGCAGGG		CCCTGGCC C GGGCCACC	
42	GGUGGCC CUGAUGAG X CGAA TGGCAGG		CTG9GCC C GGCCACCC	
46	CGCGGGGU CUGAUGAG X CGAA TCGGGG		GGCCCGC C ACCCCCGC	
47	CGCGGGG CUGAUGAG X CGAA TCGCGGG		CCCCGGCC A CCCCCCG	
49	AUCGCGG CUGAUGAG X CGAA TUGGCCG		CGGGCAC C CC0CGAT	
50	CAUGCGG CUGAUGAG X CGAA TUGGCCG		CGGCCACC C CGCGATG	
51	GCAUCGG CUGAUGAG X CGAA TUGGCC		GGCCACC C CGGATGC	
52	GGCAUCC CUGAUGAG X CGAA TGGUGG		GCCACCC C GCGATGC	
60	GAGCGCG CUGAUGAG X CGAA TCAUCGG		CGGATGC C CGCGCTC	
67	CAGCGGG CUGAUGAG X CGAA TCGCGCG		CCGCGCG T CC0CGCTG	
69	GGCAGCG CUGAUGAG X CGAA TAGCGCG		GGCGCTC C CC0CTGCC	
70	CGGCGAG CUGAUGAG X CGAA TAGCGCG		CGCGCTC C CGTGGCG	
71	UGCGCAG CUGAUGAG X CGAA TGGAGCG		GGCTGCC C GCTGCCG	
74	GGCUGCG CUGAUGAG X CGAA TCGGGAG		CTCCCCG T GCGAGCC	
77	CACGGCUC CUGAUGAG X CGAA TACGGGG		CCGCTGC C GAGCCGTG	
82	GAGCGCA CUGAUGAG X CGAA TCUCGGCA		TGCCGAG C GTGCGCTC	
89	CAGCAGG CUGAUGAG X CGAA TCGCAGG		CCGTGCG T CCTGCTG	
91	CGCAGCAG CUGAUGAG X CGAA TAGCGCAC		GTGCGCTC C CT3CTGG	
92	CGCAGCA CUGAUGAG X CGAA TAGCGCA		TGCGCTCC C TGCTGCG	
93	UGCGCAG CUGAUGAG X CGAA TGGAGCG		GGCTTCC T GCTGGCA	
96	GGCUGCG CUGAUGAG X CGAA TCGGGAG		CTCCCTGC T GCGCAGCC	
101	GUAGUGG CUGAUGAG X CGAA TCGCAGCA		TGCTGCG A GCGACTAC	
104	CGGUAGU CUGAUGAG X CGAA TCUGCGCA		TGCGCAG C ACTACGCG	
105	CGCGUAG CUGAUGAG X CGAA TGUCCGC		GGCAGCC A CTACCGG	
107	CUCGCGU CUGAUGAG X CGAA TUGGUGC		CGAGCAC T AC0CGAG	
110	CACUCGC CUGAUGAG X CGAA TUGUGGC		GCCACTAC C GCGAGGTG	
120	CCAGCGG CUGAUGAG X CGAA TCACUCG		CGAGTGC T GCGCTGG	
123	UGGCCAGC CUGAUGAG X CGAA TCAGCAC		GGTGTGC C GCTG3CCA	
126	ACGUGGC CUGAUGAG X CGAA TCGCAGC		GCTGCGC T GGCCAGT	
130	ACGAACG CUGAUGAG X CGAA TCCAGCG		CCGTGTC C AGTTCGT	
131	CACGAAC CUGAUGAG X CGAA TCCAGCG		CGTGGCC A CGTTCGT	
146	GGGCCCA CUGAUGAG X CGAA TCGCGCA		TGCGGCG C TGGGCC	
147	GGGGCCC CUGAUGAG X CGAA TGGCGCG		GCGGCGC T GGGGCC	
153	AGCCUUG CUGAUGAG X CGAA TCCCGAG		CCTGGGC C CCGAGCT	
154	CAGCCUG CUGAUGAG X CGAA TGGCCAG		CTGGGCC C CAGGGCTG	

Table 14

155	CCAGCCCU CUGAUGAG X CGAA IGGCCCCA	TGGGCCCC C AGGGCTGG
156	CCAGCCCC CUGAUGAG X CGAA IGGCCCCC	GGGGCCCC A GGGCTGGC
161	CAGCCGCC CUGAUGAG X CGAA ICCUGGGG	CCGAGGGC T GGCGGCTG
168	GCUCACCC CUGAUGAG X CGAA ICCGCCAG	CTGGCGGC T GGTGCAGC
174	CCCGCGC CUGAUGAG X CGAA ICACCAGC	GCTGGTGC A GCGCGGGG
185	AGCGCCG CUGAUGAG X CGAA IUCCCCGC	GCGGGAC C CGGGGCT
186	AAGCCGCC CUGAUGAG X CGAA IGUCCCCG	CGGGACC C GCGGCTT
193	CGCGGAA CUGAUGAG X CGAA ICCGCGG	CCGGGGC T TTCCGCGC
197	CAGCGGC CUGAUGAG X CGAA IAAAGCGG	GGCTTTC C GCGCGCTG
204	GGCGCAC CUGAUGAG X CGAA ICGCGCGG	CGCGCGC T GGTGGCC
211	AGGCACUG CUGAUGAG X CGAA ICACCCAG	CTGGTGC C CAGTGCCT
212	CAGGCACU CUGAUGAG X CGAA TGGCACC	TGGTGGC C AGTGCCTG
213	CCAGGCAC CUGAUGAG X CGAA TGGCCACC	GGTGGCC A GTGCTGG
218	GCACACCA CUGAUGAG X CGAA ICACUUGG	CCAGTGC C TGGTGTGC
219	CGCACACC CUGAUGAG X CGAA TGCACUGG	CCAGTGC T GGTGTGGG
231	CGUCCAC CUGAUGAG X CGAA ICACGCAC	GTGCTGC C CTGGGACG
232	GGUCCCA CUGAUGAG X CGAA TGCACGCA	TGGTGGC C TGGGACG
233	UGCGUCC CUGAUGAG X CGAA TGGCACGC	GGTGGCC T GGGACGCA
241	GGCGCGC CUGAUGAG X CGAA TGUCCCCA	TGGGACC A CGGCCGCC
246	CGGGGGG CUGAUGAG X CGAA ICCUGGGG	CGCACGC C GCGCCCCG
249	CGCGGGG CUGAUGAG X CGAA TCGGCCGU	ACGGCGC C CCGCGCGG
250	CGCGCGG CUGAUGAG X CGAA TGGCGCGG	CGCGGCC C CCGCGCGG
251	GGCGGGG CUGAUGAG X CGAA TGGCGGCC	GGCGGCC C CCGCGCGG
252	GGCGGGG CUGAUGAG X CGAA TGGCGGGC	GGCGGCC C CCGCGCGG
253	GGCGGGG CUGAUGAG X CGAA TGGCGGGG	GGCGGCC C CCGCGCGG
256	GAGGGGG CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
259	AAGGAGG CUGAUGAG X CGAA TCGGCGGG	GGCGGCC C CCGCGCGG
260	GAAGGAG CUGAUGAG X CGAA TCGGCGGG	GGCGGCC C CCGCGCGG
261	GGAAGGAG CUGAUGAG X CGAA TGGCGGGG	GGCGGCC C CCGCGCGG
262	CGGAAGG CUGAUGAG X CGAA TGGCGGGG	GGCGGCC C CCGCGCGG
263	CGGAAGG CUGAUGAG X CGAA TGGCGGGG	GGCGGCC C CCGCGCGG
265	UGCGGAA CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
266	CUGGCGG CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
269	CACCUCC CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
272	GGACACCU CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
273	AGGACACC CUGAUGAG X CGAA TGGGGGGG	GGCGGCC C CCGCGCGG
280	UUCAGGCA CUGAUGAG X CGAA TACACCUG	GGCGGCC C CCGCGCGG
281	CUUCAGGC CUGAUGAG X CGAA TACACCUG	GGCGGCC C CCGCGCGG
284	CUUCUCCA CUGAUGAG X CGAA TACAGGAC	GGCGGCC C CCGCGCGG
285	GUUCUUC CUGAUGAG X CGAA TACAGGAC	GGCGGCC C CCGCGCGG
294	GGGCGACC CUGAUGAG X CGAA TCCACCCG	GGCGGCC C CCGCGCGG
301	AGCACUC CUGAUGAG X CGAA TCCACCCA	GGCGGCC C CCGCGCGG
302	CAGCACUC CUGAUGAG X CGAA TCCACCCA	GGCGGCC C CCGCGCGG
309	GCUCUCC CUGAUGAG X CGAA TACACUCC	GGCGGCC C CCGCGCGG
312	ACAGCCUC CUGAUGAG X CGAA TACACUCC	GGCGGCC C CCGCGCGG
318	GCUCGCAC CUGAUGAG X CGAA TCCUCCG	GGCGGCC C CCGCGCGG
345	CGAAGGCC CUGAUGAG X CGAA TACCUUC	GGCGGCC C CCGCGCGG

Table 14

349	AAGCCGAA	CUGAUGAG	X	CGAA	ICCCAGCAC		GTGCTGGC	C	TCGCGCTT	
350	GAAGCCGA	CUGAUGAG	X	CGAA	IGCCAGCA		TGCTGGCC	T	TCGCGCTT	
356	CAGCGCGA	CUGAUGAG	X	CGAA	ICCGAAGG		CCTTCGCG	T	TCGCGCTG	
363	CGUCCAGC	CUGAUGAG	X	CGAA	ICGCGAAG		CTTCGCGC	T	GCTGAGCG	
366	CCCCGUCC	CUGAUGAG	X	CGAA	ICAGCGCG		CGCGCTGC	T	GGACGGGG	
376	CCCCCGCG	CUGAUGAG	X	CGAA	ICCCCGUC		GACGGGGC	C	CGCGGGGG	
377	GCCCCCGC	CUGAUGAG	X	CGAA	IGCCCCGU		ACGGGGCC	C	GGGGGGGG	
386	CUCGGGGG	CUGAUGAG	X	CGAA	ICCCCCCG		GGGGGGGC	C	CCCCCGAG	
387	CCUCGGGG	CUGAUGAG	X	CGAA	IGCCCCCG		CGGGGGCC	C	CCCCGAGG	
388	GCCUCGGG	CUGAUGAG	X	CGAA	IGGGCCCC		GGGGGGCC	C	CCCGAGGC	
389	GGCCUCGG	CUGAUGAG	X	CGAA	IGGGCCCC		GGGGGGCC	C	CCCGAGGC	
390	AGGCCUCG	CUGAUGAG	X	CGAA	IGGGGGCC		GGGGGGCC	C	CGAGGCTT	
391	AAGGCCUC	CUGAUGAG	X	CGAA	IGGGGGCC		GGGGGGCC	C	GAGGCTT	
397	GUGGUGAA	CUGAUGAG	X	CGAA	ICCUAGGG		CCCGAGGC	C	TTACCCAC	
398	GGUGGUGA	CUGAUGAG	X	CGAA	IGCCUCGG		CCGAGGCC	T	TCACCCAC	
401	GCUGGUGG	CUGAUGAG	X	CGAA	IAAGGCCU		AGGCTTTC	A	CCACGAGC	
403	ACGCGUGU	CUGAUGAG	X	CGAA	IUGAAGGC		GCCTTCAC	C	ACCAGCGT	
404	CACGCGGG	CUGAUGAG	X	CGAA	IGUGAAGG		CCTTCACC	A	CCAGCGTG	
406	CGCACGCU	CUGAUGAG	X	CGAA	IUGUGAAG		TTACCCAC	C	ACCGTGCG	
407	GCGCACGC	CUGAUGAG	X	CGAA	IUGUGUGA		TCACCCAC	A	GGGTGCGC	
416	CAGGUAGC	CUGAUGAG	X	CGAA	ICGCACGC		GGGTGCGC	A	GCTACTCT	
419	GGCGAGGU	CUGAUGAG	X	CGAA	ICUCCGCA		TGCGCAGC	T	ACCTGCC	
422	GUUGGGCA	CUGAUGAG	X	CGAA	IUAGCUGC		GCAGCTAC	C	TGCCCAAC	
423	UGUUGGGC	CUGAUGAG	X	CGAA	IUGAGCUG		CAGCTACC	T	GCCCAACA	
426	CCGUGUUG	CUGAUGAG	X	CGAA	ICAGGUAG		CTACTGCG	C	CAACACGG	
427	ACCGUGUU	CUGAUGAG	X	CGAA	IGCAGGUA		TACTTGCC	C	AACACGGT	
428	CACCGUGU	CUGAUGAG	X	CGAA	IGCAGGUA		ACCTGCC	A	ACACGGTG	
431	GGUCACCG	CUGAUGAG	X	CGAA	IUGCGGUA		TGCCCAAC	A	CGGTGACC	
439	AGUGCGUC	CUGAUGAG	X	CGAA	IUCACCGU		ACGGTGAC	C	GACGCACT	
445	CCCCCGAG	CUGAUGAG	X	CGAA	ICGUCGGU		ACCGACGC	A	CTGCGGAG	
447	UCCCCCGC	CUGAUGAG	X	CGAA	IUGCGUCG		GCAGCGAC	T	GGGGGAGA	
471	GCAGCAGC	CUGAUGAG	X	CGAA	ICCCCCAC		GTGGGGGC	T	GCTGCTGC	
474	GGCGCAGC	CUGAUGAG	X	CGAA	ICAGCCCC		GGGGCTGC	T	GCTGCGCC	
477	CGCGCGCG	CUGAUGAG	X	CGAA	ICAGCAGC		GCTGCTGC	T	GCGCCGCG	
482	GCCCCAGC	CUGAUGAG	X	CGAA	TCGCAGCA		TGCTGCGC	C	GCCTGGGC	
501	GGUGAACC	CUGAUGAG	X	CGAA	ICACGUCG		GCAGCTGC	T	GGTTTACC	
507	CCAGCAGG	CUGAUGAG	X	CGAA	IAACACAG		GCTGGTTC	A	CCTGCTGG	
509	UGCCAGCA	CUGAUGAG	X	CGAA	IUGAACCA		TGTTTACC	C	TGCTGGCA	
510	GUGCCAGC	CUGAUGAG	X	CGAA	IGUGAACC		GGTTTACC	T	GCTGGCAC	
513	AGCGUGCC	CUGAUGAG	X	CGAA	ICAGGUGA		TCACCTGC	T	GGCACGCT	
517	GCGCAGCG	CUGAUGAG	X	CGAA	ICCAGCAG		CTGCTGGC	A	CGCTGCGC	
521	GAGCGCGC	CUGAUGAG	X	CGAA	ICGUGCCA		TGCGACGC	T	GGCGGCTC	
528	GCACAAAG	CUGAUGAG	X	CGAA	ICGCGCAG		CTGCGCGC	T	CTTTGTGC	
530	CAGCAAAG	CUGAUGAG	X	CGAA	IAGCGGCG		GGCGGCTC	T	TTTGTGCT	
537	GAGCCACC	CUGAUGAG	X	CGAA	ICACAAAG		CTTTGTGC	T	GGTGGCTC	
544	CAGCUGGG	CUGAUGAG	X	CGAA	ICACCCAG		CTGGTGGC	T	CCAGCTGC	
546	CGCAGCUG	CUGAUGAG	X	CGAA	IAGCCACC		GCTGGCTC	C	CAGCTGGC	

Table 14

547	GCGCAGCU CUGAUGAG X CGAA IGAGCCAC		GTGGCTCC C AGCTGGCC	
548	GGCGCAGC CUGAUGAG X CGAA IGGAGCCA		TGGCTCCC A GCTGGGCC	
551	GUAGGCOC CUGAUGAG X CGAA ICUGGGAG		CTCCCTAGC T GGCGCTAC	
556	ACCUGGUA CUGAUGAG X CGAA ICGCAGCU		AGCTGGCC C TACCAGGT	
557	CACCUUGU CUGAUGAG X CGAA IGGGAGC		GCTGGGCC T ACCAGTG	
560	GCACACCU CUGAUGAG X CGAA IUAGGCGC		GGCCTAC C AGGTGTGC	
561	CGCACACC CUGAUGAG X CGAA IGUAGGCG		CGCCTACC A GGTGTGCG	
573	ACAGCGGC CUGAUGAG X CGAA ICCGCGAC		GTGCGGGC C GCGCTGT	
576	GGUACAGC CUGAUGAG X CGAA ICGGCCCC		CGGCGCGC C GCTGTACC	
579	CGUGGUAC CUGAUGAG X CGAA ICGGCGCG		CGCGCGCC T GTACCAGC	
584	CGCGAGCU CUGAUGAG X CGAA IUACAGCG		CGCTGTAC C AGCTCGGC	
585	CGCGGAGC CUGAUGAG X CGAA IGUACAGC		GCTGTACC A GCTGCGGC	
588	CAGCGCCG CUGAUGAG X CGAA ICUGGUAC		GTACCAGC T CGCGCTG	
595	UGAGUGGC CUGAUGAG X CGAA ICGCGGAG		CTCGCGGC T GCCACTA	
598	GCCUGAGU CUGAUGAG X CGAA ICAGCGCC		GGCGCTGC C ACTCAGGC	
599	GGCCUGAG CUGAUGAG X CGAA IGCAGGCC		GGCGTGCC A CTCAGGCC	
601	CGGGCCUG CUGAUGAG X CGAA IUGGAGC		GCTGCCAC T CAGCGCCG	
603	GCCGGGCC CUGAUGAG X CGAA IAGUGGCA		TGCCACTC A GGCCCGGC	
607	GGGGGCCG CUGAUGAG X CGAA ICCUGAGU		ACTCAGGC C GGCGCCCC	
608	CGGGGGCC CUGAUGAG X CGAA IGCUCAG		CTCAGGCC C GGCCCCG	
612	GUGGCGGG CUGAUGAG X CGAA ICCGGGCC		GGCCCGGC C CCGCCAC	
613	UGUGGGGG CUGAUGAG X CGAA IGGCGGGC		GGCCCGGC C CCGCCACA	
614	GUGUGGGC CUGAUGAG X CGAA IGGCGGGG		CCCGGCC C CGCCACAC	
615	CGUGGGC CUGAUGAG X CGAA IGGCGGGG		CCCGGCC C GCACAGC	
618	UAGCGUGU CUGAUGAG X CGAA IGGGGGGC		GGCCCGGC C ACAGGCTA	
619	CUAGCGUG CUGAUGAG X CGAA IGGGGGGG		CCCGGCC C CAGCTAG	
621	CACUAGCG CUGAUGAG X CGAA IUGGCGGG		CCCGGCC C CGTAGTG	
625	GGUCCACU CUGAUGAG X CGAA ICGUGUGG		CCACAGC T AGTGAACC	
633	GCCUUCGG CUGAUGAG X CGAA IUCCACUA		TAGTGACC C CCGAGGC	
634	CGCCUUCG CUGAUGAG X CGAA IGUCCACU		AGTGAGC C CGAAGGC	
635	ACGCCUUC CUGAUGAG X CGAA IACGCCUU		GTGAGCCC C GAAGCGT	
645	CGCAUCCC CUGAUGAG X CGAA IACGCCUU		IAGCGGTC T GGGATGG	
661	UGGUUCCA CUGAUGAG X CGAA ICCGUUUC		GAACGGGC C TGGAAACA	
662	AUGGUUCC CUGAUGAG X CGAA ICGCGUUC		AAACGGGC T GGAACAT	
668	GACGCUAU CUGAUGAG X CGAA IUUCCAGG		CCTGGAAC C ATAGGCTC	
669	UGAGCUUA CUGAUGAG X CGAA IGUUCCAG		CTGGAACC A TAGGCTCA	
677	GGCCUCCC CUGAUGAG X CGAA IACGCUAU		ATAGGCTC A GGGAGGCC	
685	GGGACCCC CUGAUGAG X CGAA ICCUCCCU		AGGAGGC C GGGTCCC	
692	GGCCAGGG CUGAUGAG X CGAA IACCCCGG		CGGGGTC C CCTGGGC	
693	GGCCAGGG CUGAUGAG X CGAA IGACCCCG		CGGGTCC C CCGGGCC	
694	AGGCCAGG CUGAUGAG X CGAA IGGACCCC		GGGTCCC C CTGGGCT	
695	CAGGCCCA CUGAUGAG X CGAA IGGGACCC		GGTCCCC C TGGGCTG	
696	GCAGGCCC CUGAUGAG X CGAA IGGGACCC		CCTGGGC C TGCCAGCC	
701	GGCUGGCA CUGAUGAG X CGAA ICCAGGGG		CCTGGGC T GCGAGCCC	
702	GGCUGGCG CUGAUGAG X CGAA IGGGACCC		GGGCTGC C AGCCCCG	
705	CGGGGCU CUGAUGAG X CGAA ICGAGCCC		GGCTGCC A GGCCCCG	
706	CCCGGGC CUGAUGAG X CGAA ICGAGGCC			

Table 14

709	GCACCCGG	CUGAUGAG	X	CGAA	ICUGGCAG		CTGCCAGC	C	CGGGTGC	
710	CGCACCG	CUGAUGAG	X	CGAA	IGCUGGCA		TGCCAGCC	C	CGGGTGC	
711	UCGCACCC	CUGAUGAG	X	CGAA	IGGCUGGC		GCCAGCCC	C	GGGTGCA	
734	GUGGCAC	CUGAUGAG	X	CGAA	ICCCCGC		CGGGGGC	A	GTGCCAGC	
739	CUUGGGCU	CUGAUGAG	X	CGAA	ICACUGCC		GGCAGTGC	C	AGCGAAG	
740	ACUUCGGC	CUGAUGAG	X	CGAA	IGCACUJC		GCAGTGC	A	GCCGAAGT	
743	CAGACUUC	CUGAUGAG	X	CGAA	ICUGGCAC		GTGCCAGC	C	GAAGTCTG	
750	GCAACGGC	CUGAUGAG	X	CGAA	IACUUCGG		CCGAAGTC	T	GCGTTGC	
753	UGGGCAAC	CUGAUGAG	X	CGAA	ICAGACUU		AAGTCTGC	C	GTGCCCA	
759	GCCUCUUG	CUGAUGAG	X	CGAA	ICAAAGGC		GCGTTCG	C	CAAGAGGC	
760	GGCCUUCU	CUGAUGAG	X	CGAA	IGCAACGG		CGTTGCC	C	AAGAGGCC	
761	GGGCCUUC	CUGAUGAG	X	CGAA	IGGCACG		CGTTGCC	A	AGAGGCC	
768	CACGCCUUG	CUGAUGAG	X	CGAA	ICCUUCU		CAAGAGGC	C	CAGGCGTG	
769	CCAGCCU	CUGAUGAG	X	CGAA	IGCCUUCU		AAGAGGCC	C	AGGCGTG	
770	GCCACGCC	CUGAUGAG	X	CGAA	IGGCCUUC		AGAGGCC	A	GGGTGCG	
781	UCAGGGC	CUGAUGAG	X	CGAA	ICGCCAG		CGTGGCG	T	GCCCTGA	
784	GGCUCAGG	CUGAUGAG	X	CGAA	ICAGCGC		GGCGTGC	C	CTGAGCC	
785	CAGCUCAG	CUGAUGAG	X	CGAA	IGCAGCGC		GGCGTGC	C	CTGAGCC	
786	CCGGCUCA	CUGAUGAG	X	CGAA	IGGCAGG		CGCTGCC	C	TGAGCCG	
787	UCCGGCUC	CUGAUGAG	X	CGAA	IGGGCAGC		GCTGCCCT	T	GAGCCGGA	
792	UCCGCUC	CUGAUGAG	X	CGAA	ICUCAGG		CCCTGAGC	C	GGAGCGGA	
804	GCCCAACG	CUGAUGAG	X	CGAA	ICGUCGC		GGGAGCG	C	CGTTGGC	
805	UGCCCAAC	CUGAUGAG	X	CGAA	IGCUUCG		CGGAGCC	C	GTGGGCA	
813	AGGACCCC	CUGAUGAG	X	CGAA	ICCCAACG		CGTGGGC	A	GGGTCTT	
820	UGGGCCCA	CUGAUGAG	X	CGAA	IACCCUUG		CAGGGTTC	C	TGGGCCCA	
821	GUGGGCCC	CUGAUGAG	X	CGAA	IGACCCCU		AGGGTTC	T	GGGCCCA	
826	CCCGGUG	CUGAUGAG	X	CGAA	ICCCAGGA		TCCTGGGC	C	CACCCGG	
827	GCCCGGCU	CUGAUGAG	X	CGAA	IGCCAGG		CCTGGGC	C	ACCCGGC	
828	UGCCCGGG	CUGAUGAG	X	CGAA	IGGCCAG		CTGGGCC	A	CCCGGCA	
830	CUUGCCG	CUGAUGAG	X	CGAA	IUGGGCCC		GGGCCAC	C	CGGCAGG	
831	UCUUGCCC	CUGAUGAG	X	CGAA	IUGGGCCC		GGGCCAC	C	GGCAGGA	
836	ACCGGUCC	CUGAUGAG	X	CGAA	ICCCGGGU		ACCCGGGC	A	GGAGCGT	
849	GUUCACUC	CUGAUGAG	X	CGAA	IUCCACGC		GGGTGAC	C	GAGTGACC	
857	GAACACAC	CUGAUGAG	X	CGAA	IUCACUG		CGGTGAC	C	GAGTGACC	
866	CACACAC	CUGAUGAG	X	CGAA	IACACAC		CGGTGAC	C	GAGTGACC	
877	CUGGCAGG	CUGAUGAG	X	CGAA	IACACAC		GTGTGTC	A	CTGCCAG	
879	GUUCGGCA	CUGAUGAG	X	CGAA	IUGACACC		GGTGTAC	C	TGCCAGC	
880	GUUCGGC	CUGAUGAG	X	CGAA	IUGACAC		GTGTACC	T	GCCAGACC	
883	GCGGUUCU	CUGAUGAG	X	CGAA	ICAGUAGA		TCACCTGC	C	AGACCCGC	
884	GGCGGUUC	CUGAUGAG	X	CGAA	IGCAGGUG		CACCTGCC	A	GAACCCGC	
888	CUUCGGCG	CUGAUGAG	X	CGAA	IUCUGGCA		TGCCAGC	C	CGCCGAAG	
889	UCUUCGGC	CUGAUGAG	X	CGAA	IUCUGGCA		GCCAGACC	C	GCCGAAGA	
892	GCUCUUC	CUGAUGAG	X	CGAA	ICGGGUUC		AGACCCGC	C	GAAGAAGC	
901	AAAGAGGU	CUGAUGAG	X	CGAA	ICUUCUUC		GAAGAAGC	C	ACCTCTTT	
902	CAAGAGGG	CUGAUGAG	X	CGAA	IGCUUCU		AAAGAAGC	A	CCTCTTTG	
904	UCCAAAGA	CUGAUGAG	X	CGAA	IUGGUUC		GAAGCCAC	C	TCTTTGGA	
905	CUCAAAG	CUGAUGAG	X	CGAA	IUGGUUC		AAGCCACC	T	CTTTGGAG	

Table 14

907	CCCUCAA	CUGAUGAG	X	CGAA	IAGGUGGC		GCCACCTC	T	TGGAGGG	
921	UGCCAGAG	CUGAUGAG	X	CGAA	ICGCACCC		GGGTGGC	T	CTCTGGCA	
923	CGUGCCAG	CUGAUGAG	X	CGAA	IAGCGCAC		GTGGCTC	T	CTGGCACG	
925	CGCGUGCC	CUGAUGAG	X	CGAA	IAGAGCGC		GCCCTCTC	T	GGCAGCG	
929	GUGGCGCG	CUGAUGAG	X	CGAA	ICGAGAGA		TCTCTGGC	A	CGCGCCAC	
935	GUGGGAGU	CUGAUGAG	X	CGAA	ICGCGUC		GCACGCGC	C	ACTCCACC	
936	GGUGGGAG	CUGAUGAG	X	CGAA	ICGCGGUG		CACGCGCC	A	CTCCACC	
938	UGGGUGGG	CUGAUGAG	X	CGAA	IUGGCGCG		CGCGCCAC	T	CCACCCA	
940	GAUGGGUG	CUGAUGAG	X	CGAA	IAGUGGCG		CGCCACTC	C	CACCATC	
941	GGAUGGGU	CUGAUGAG	X	CGAA	IAGUGGCG		GCCACTCC	C	ACCCATCC	
942	CGGAUGGG	CUGAUGAG	X	CGAA	IGGAGUGG		CCACTCCC	A	CCCATCCG	
944	CACGGAUG	CUGAUGAG	X	CGAA	IUGGAGU		ACTCCACC	C	CATCGGTG	
945	CCACGGAU	CUGAUGAG	X	CGAA	IGUGGGAG		CTCCACC	C	ATCCGTGG	
946	CCCACGGA	CUGAUGAG	X	CGAA	IGUGGGGA		TCCACACC	A	TCCGTGGG	
949	CGCGCCAC	CUGAUGAG	X	CGAA	TAUGGGUG		CACCATC	C	GTGGCCCG	
956	GUGCGGCG	CUGAUGAG	X	CGAA	ICCCACGG		CGGTGGC	C	GCCAGCAC	
959	GUGGUGCU	CUGAUGAG	X	CGAA	ICGGCCCA		TGGGCGCC	C	AGCACCAC	
960	CGUGGUGC	CUGAUGAG	X	CGAA	ICGCGCCC		GGGCGGCC	A	GCACACAG	
963	CCGCGUGG	CUGAUGAG	X	CGAA	ICUGGCGG		CGCGCAGC	A	CCACGGGG	
965	GGCGCGCU	CUGAUGAG	X	CGAA	IUGCGGCG		GCCAGCAC	C	ACGCGGCC	
966	GGCGCGCG	CUGAUGAG	X	CGAA	IUGCGGCG		CCAGCAC	A	CGCGGGCC	
974	GGAUGGGG	CUGAUGAG	X	CGAA	ICCCCGCU		ACGCGGGC	C	CCCATCC	
975	UGGAUGGG	CUGAUGAG	X	CGAA	IGCCCGCG		CGCGGGCC	C	CCCATCCA	
976	GUGGAUGG	CUGAUGAG	X	CGAA	IGCCCGCG		GCGGGGCC	C	CCATCCAC	
977	UGUGGAUG	CUGAUGAG	X	CGAA	IGGGCCCG		CGGGGGCC	C	CATCCACA	
978	AUGUGGAU	CUGAUGAG	X	CGAA	IGGGCCCG		GGGGGGCC	C	ATCCACAT	
979	GAUGUGGA	CUGAUGAG	X	CGAA	IGGGGGCC		GGGGGGCC	A	TCCACATC	
982	CGCGAUGU	CUGAUGAG	X	CGAA	TAUGGGGG		CCCCCATC	C	ACATCGGG	
983	CCGCGAUG	CUGAUGAG	X	CGAA	IGAUGGGG		CCCCCATC	A	CATCGCGG	
985	GGCGCGGA	CUGAUGAG	X	CGAA	IUGGAUGG		CCATCCAC	A	TGGCGGCC	
993	CAGGUGGU	CUGAUGAG	X	CGAA	ICCGCGAU		ATCGGGCG	C	ACACGCTC	
994	GGACGUGG	CUGAUGAG	X	CGAA	IGCCCGGA		TGCGGGCC	A	CCACGTC	
996	AGGGACGU	CUGAUGAG	X	CGAA	IUGGCGCG		GGGGCCAC	C	AGTCCTCT	
997	CAGGGACG	CUGAUGAG	X	CGAA	IGUGGCGG		GGGGCCAC	A	CGTCCCTG	
1002	UGUCCAG	CUGAUGAG	X	CGAA	IACGUGGU		ACCACGTC	C	CTGGGACA	
1003	GUGUCCCA	CUGAUGAG	X	CGAA	IGACGUGG		CCACGTCC	C	TGGGACAC	
1004	CGUGUCCC	CUGAUGAG	X	CGAA	IGGACGUG		CACGTCCC	T	GGGACACG	
1010	ACAAGCGG	CUGAUGAG	X	CGAA	IUCCACAG		CCTGGGAC	A	CGCTTGTT	
1014	GGGACAA	CUGAUGAG	X	CGAA	ICGUGUCC		GGACACGC	C	TGTCCCC	
1015	GGGGACAA	CUGAUGAG	X	CGAA	IGCGUGUC		GACACGCT	T	TGTCCCC	
1020	ACACCGGG	CUGAUGAG	X	CGAA	IACAAGGC		GCCTTGTC	C	CCCGGTGT	
1021	UACACCGG	CUGAUGAG	X	CGAA	IGACAAGG		CCTTGCTC	C	CGGTGTGA	
1022	GUACACCG	CUGAUGAG	X	CGAA	IGGACAAG		CTTGCTCC	C	CGGTGTAC	
1023	CGUACACC	CUGAUGAG	X	CGAA	IGGGACAA		TGTGCTCC	C	GGTGTACG	
1033	UGGUCUC	CUGAUGAG	X	CGAA	ICGUAAC		GTGTACGC	C	GAACACAA	
1039	AAGUGCUU	CUGAUGAG	X	CGAA	IUCUCGGC		GCGAGAC	C	AAGCACTT	
1040	GAAGUCU	CUGAUGAG	X	CGAA	IGUCUGGG		CCGAGACC	A	AGCACTTC	

Table 14

1044	AGAGGAAG	CUGAUGAG	X	CGAA	ICUUGGUC		GACCAAGC	A	CTTCTCTT	
1046	GUAGAGGA	CUGAUGAG	X	CGAA	IUGCUUGG		CCAAGCAC	T	TCCTCTAC	
1049	GGAGUAGA	CUGAUGAG	X	CGAA	IAAGUGCU		AGCACTTC	C	TCTACTCC	
1050	AGGAGUAG	CUGAUGAG	X	CGAA	IGAAGUGC		GCATCTCC	T	CTACTCCT	
1052	UGAGGAGU	CUGAUGAG	X	CGAA	IAGGAAGU		ACTTCTCT	T	ACTCTCTA	
1055	GCCUGAGG	CUGAUGAG	X	CGAA	IUAGAGGA		TCCTCTAC	T	CCTCAGGC	
1057	UCGCCUGA	CUGAUGAG	X	CGAA	IAGUAGAG		CTCTACTC	C	TACGGCGA	
1058	GUCGCCUG	CUGAUGAG	X	CGAA	IGAGUAGA		TCTACTCC	T	CAGGCGAC	
1060	UUGCGGCC	CUGAUGAG	X	CGAA	IAGGAGUA		TACTCTCT	A	GCGACAA	
1067	CUGCCUCU	CUGAUGAG	X	CGAA	IUCGCCUG		CAGCGCAC	A	AGGAGCAG	
1074	GCCGCAGC	CUGAUGAG	X	CGAA	ICUCCUUG		CAAGGAGC	A	GCTGCGGC	
1077	AGGGCCGC	CUGAUGAG	X	CGAA	ICUGCUCU		GGAGCAGC	T	GCGGCCCT	
1083	GGAAAGGAG	CUGAUGAG	X	CGAA	ICCGCAGC		GCTGCGGC	C	CTCTCTCC	
1084	AGGAAGGA	CUGAUGAG	X	CGAA	IGCCGCGC		CTGCGGCC	C	TCCTCTCT	
1085	UAGGAAGG	CUGAUGAG	X	CGAA	IGGCCGCA		TGCGGCCCT	T	CTCTCTTA	
1087	AGUAGGAA	CUGAUGAG	X	CGAA	IAGGGCCG		CSCGCCCT	C	TCTCTACT	
1088	GAGUAGGA	CUGAUGAG	X	CGAA	IGAGGGCC		GGCCCTCT	T	TCCTACTC	
1091	GCUGAGUA	CUGAUGAG	X	CGAA	IAAGGAGG		CCTCTCTT	C	TACTCAGC	
1092	AGCUGAGU	CUGAUGAG	X	CGAA	IGAAGGAG		CTCTCTCT	T	ACTCAGCT	
1095	GAGAGCUG	CUGAUGAG	X	CGAA	IUAGGAAG		CTCTCTAC	T	CAGCTCTC	
1097	CAGAGAGC	CUGAUGAG	X	CGAA	IAGUAGGA		TCCTACTC	A	GCTCTCTG	
1100	CCUCAGAG	CUGAUGAG	X	CGAA	ICUGAGUA		TACTCAGC	T	CTCTGAGG	
1102	GGCCUCAG	CUGAUGAG	X	CGAA	IAGCUGAG		CTCAGCTC	T	CTGAGGCC	
1104	UGGCCUUC	CUGAUGAG	X	CGAA	IAGAGCUG		CAGCTCTC	T	GAGGCCCA	
1110	UCAGGCUG	CUGAUGAG	X	CGAA	ICUCACAG		TCTGAGGC	C	CAGCCTGA	
1111	GUCAGGCU	CUGAUGAG	X	CGAA	IGCCUCAG		CTGAGGCC	C	AGCCTGAC	
1112	AGUCAGGC	CUGAUGAG	X	CGAA	IGGCCUCA		TGAGGCCA	A	GCCTGACT	
1115	GCCAGUCA	CUGAUGAG	X	CGAA	ICUGGGCC		GGCCCAGC	C	TGACTGGC	
1116	CGCCAGUC	CUGAUGAG	X	CGAA	IGCUGGGC		GCCACAGC	T	GACTGGGC	
1120	CGAGCGCC	CUGAUGAG	X	CGAA	IUCAGGCU		AGCCTGAC	T	GGCGCTCG	
1126	AGCCUCCG	CUGAUGAG	X	CGAA	ICGCCAGU		ACTGGCCG	T	CGGAGGCT	
1134	UCUCCACG	CUGAUGAG	X	CGAA	ICCUCCGA		TCGGAGGC	T	CGTGAGGA	
1144	AGAAAGAU	CUGAUGAG	X	CGAA	IUCUCCAC		GTGGAGAC	C	ATCTTTCT	
1145	CAGAAAGA	CUGAUGAG	X	CGAA	TGUCUCCA		TGGAGACC	A	TCCTTTCTG	
1148	ACCCAGAA	CUGAUGAG	X	CGAA	IAUGGUUC		AGACCATC	T	TCTTGGGT	
1152	UGGAACCC	CUGAUGAG	X	CGAA	IAAAGAUG		CATCTTTC	T	GGGTTCGA	
1159	CAGGGCCU	CUGAUGAG	X	CGAA	IAACCCAG		CTGGGTTT	C	AGGCCCTG	
1160	CCAGGGCC	CUGAUGAG	X	CGAA	IGAAACCA		TGGGTTTC	A	GGCCCTGG	
1164	GCAUCCAG	CUGAUGAG	X	CGAA	TCUUGGAA		TTCAGGAC	C	AGGACTGC	
1165	GGCAUCCA	CUGAUGAG	X	CGAA	IGCCUGGA		TCCAGGCC	C	TGGATGCC	
1166	UGGCAUCC	CUGAUGAG	X	CGAA	IGGCCUUG		CCAGGGCC	T	GGATGCCA	
1173	GAGUCCCU	CUGAUGAG	X	CGAA	ICAUCCAG		CTGGATGC	C	AGGACTTC	
1174	GGAGUCCC	CUGAUGAG	X	CGAA	IGCAUCCA		TGGATGCC	A	GGGACTCC	
1180	CUGCGGGG	CUGAUGAG	X	CGAA	IUCCUUGG		CCAGGGAC	T	CCCCGGAG	
1182	ACCUGCGG	CUGAUGAG	X	CGAA	IAGUCCCU		AGGACTTC	C	CGCAGGTT	
1183	AACCUUGG	CUGAUGAG	X	CGAA	IGAGUCCC		GGGACTCC	C	CGCAGGTT	
1184	CAACUUGC	CUGAUGAG	X	CGAA	IGGAGUCC		GGACTCCC	C	GCAGGTTG	

Table 14

1187	GGGCAACC	CUGAUGAG	X	CGAA	ICGGGGAG		CTCCCCGC	A	GTTTCCCC	
1194	GCAGGCGG	CUGAUGAG	X	CGAA	ICAAACUG		CAGGTTCG	C	CGCCTGCG	
1195	GGCAGGCG	CUGAUGAG	X	CGAA	IGCAACCU		AGGTTCGC	C	CGCCTGCG	
1196	GGGCAAGC	CUGAUGAG	X	CGAA	IGGCAACC		GGTTGCCG	C	GCCTGCCG	
1199	CUGGGGCA	CUGAUGAG	X	CGAA	ICGGGGCA		TGCCCCGC	C	TGCCCCAG	
1200	GCUGGGGC	CUGAUGAG	X	CGAA	IGCGGGGC		GCCCCCGC	T	GCCCGACG	
1203	AGGCGUGG	CUGAUGAG	X	CGAA	ICAGCGGG		CCGCTGCG	C	CAGCGGCT	
1204	UAGGCGUG	CUGAUGAG	X	CGAA	IGCAGGGG		CGCTGCGC	C	CAGCGGTA	
1205	GUAGGCGU	CUGAUGAG	X	CGAA	IGGCAAGC		GCCTGCCG	C	AGCGTACG	
1206	AGUAGGCG	CUGAUGAG	X	CGAA	IGGGCAGG		CCTGCCCG	A	GGGCTACT	
1211	UUGCCAGU	CUGAUGAG	X	CGAA	ICGCGGGG		CCGAGCGC	T	ACTGGCAA	
1214	CAUUGGCC	CUGAUGAG	X	CGAA	IUAGCGCU		AGCGCTAC	T	GGCAAAAT	
1218	GCGGCAUJ	CUGAUGAG	X	CGAA	ICCAUJAG		CTACTGGC	A	AATGCGGC	
1227	GAACACAG	CUGAUGAG	X	CGAA	ICCGCAUJ		AAATGCGC	C	CCTGTTTC	
1228	AGAAACAG	CUGAUGAG	X	CGAA	IGCGCGAU		ATGCGGGC	C	CTGTTTCT	
1229	CAGAAACA	CUGAUGAG	X	CGAA	IGGCGGCA		TGCGGGCC	C	TGTTTCTG	
1230	CCAGAAAC	CUGAUGAG	X	CGAA	IGGGCGCC		CGCGGGCC	T	GTTCCTGG	
1236	GCAGCUCG	CUGAUGAG	X	CGAA	IATAACAG		CCTGTTTC	T	GGAGCTGC	
1242	UCCCAAGC	CUGAUGAG	X	CGAA	ICUCCAGA		TCTGGAGC	T	GCTTGGGA	
1245	GGUCCCA	CUGAUGAG	X	CGAA	ICAGCUCG		GGAGCTGC	T	TGGGAACG	
1253	CUGCGCGU	CUGAUGAG	X	CGAA	IUCCCCAA		TTGGGAAC	C	ACCGGACG	
1254	ACUGCGCG	CUGAUGAG	X	CGAA	IGUCCCCA		TGGGAACC	A	CGCGCAGT	
1260	AGGCGCAC	CUGAUGAG	X	CGAA	ICGCGUGG		CCACCGGC	A	GTGCCCCG	
1265	CCCGUAGG	CUGAUGAG	X	CGAA	ICACUGCG		CGCAGTGC	C	CTACGGGG	
1266	CCCGUJAG	CUGAUGAG	X	CGAA	IGCAUJCG		GCAGTGGC	C	CTACGGGG	
1267	ACCCCGUA	CUGAUGAG	X	CGAA	IGGCAACG		CAGTGGCC	C	TAOGGGGT	
1268	CACCCGUG	CUGAUGAG	X	CGAA	IGGGCACU		AGTGGCCC	T	ACGGGGTG	
1278	UCUUGAGG	CUGAUGAG	X	CGAA	ICACCCCG		CGGGGTGC	T	CCTCAAGA	
1280	CGUCUUGA	CUGAUGAG	X	CGAA	IAGCACCC		GGGTGCTC	C	TCAAGAGC	
1281	GGUCUUGG	CUGAUGAG	X	CGAA	IAGCACCC		GGTGCTTC	T	CAAGACGC	
1283	GUUCGUCU	CUGAUGAG	X	CGAA	IAGGAGCA		TGCTCTTC	A	AGACGCAC	
1290	GCGGCGAG	CUGAUGAG	X	CGAA	ICGUCUUG		CAAGACGC	A	CTGCCCCG	
1292	CAGCGGCG	CUGAUGAG	X	CGAA	IUGCGUCU		ACACGCAC	T	GCCCGCTG	
1295	UCGACGCG	CUGAUGAG	X	CGAA	ICAGUGCG		CGCACTGC	C	CGTGGGGA	
1296	CUCGCGAG	CUGAUGAG	X	CGAA	IGCAUJCG		GCAGTGGC	C	GCTGGGAG	
1299	CAGCUCGC	CUGAUGAG	X	CGAA	ICGGGCGAG		CTGCCCGG	T	GGGAGCTG	
1306	GUGACCGC	CUGAUGAG	X	CGAA	ICUJCGCAG		CTGCGAGC	T	CGGTCAC	
1313	UGCUGGGG	CUGAUGAG	X	CGAA	IACCGCAG		CTGCGGTC	A	CCCCAGCA	
1315	GCUGCUGG	CUGAUGAG	X	CGAA	IUGACCGC		CGGTTCAC	C	CCAGCACG	
1316	GGCUGCUG	CUGAUGAG	X	CGAA	IUGAGCCG		CGGTTCAC	C	CAGCAGCG	
1317	CGGCGUCU	CUGAUGAG	X	CGAA	IGGUGACC		GGTCACCC	C	AGCAGCGG	
1318	CGGCGUCG	CUGAUGAG	X	CGAA	IGGUGAGC		GTACACCC	A	GCAGCCGG	
1321	ACACCGGC	CUGAUGAG	X	CGAA	ICUGGGGU		ACCCAGGC	A	GGCGGTGT	
1324	CAGACACC	CUGAUGAG	X	CGAA	ICUGCGUG		CCAGCAGC	C	GGTGTCTG	
1331	CGGGGCAC	CUGAUGAG	X	CGAA	IACACCGG		CGGTGTCT	T	TGCCCCGG	
1336	IUCUCGCG	CUGAUGAG	X	CGAA	ICACAGAC		GTCTGTGC	C	CGGGAGAA	
1337	CUUCUCCC	CUGAUGAG	X	CGAA	IGCAACAGA		TCTGTGCC	C	GGGAGAGG	

Table 14

1347	AGCCUUGG	CUGAUGAG	X	CGAA	ICUCUCC		GGAGAAGC	C	CCAGGGCT	
1348	GAGCCUUG	CUGAUGAG	X	CGAA	IGUCUCC		GAGAAGCC	C	CAGGGCTC	
1349	AGAGCCCU	CUGAUGAG	X	CGAA	IGGCUUCU		AGAAAGCC	C	AGGGCTCT	
1350	CAGAGCCC	CUGAUGAG	X	CGAA	IGGGCUUC		GAAGCCCC	A	GGGCTCTG	
1355	CGCCACAG	CUGAUGAG	X	CGAA	ICCCUGGG		CCAGGGGC	T	CTGTGGCG	
1357	GCCGCCAC	CUGAUGAG	X	CGAA	IAGCCUUG		CAGGGCTC	T	GTGGGGGC	
1366	UCCUCGGG	CUGAUGAG	X	CGAA	ICCGCCAC		GTGGCGGC	C	CCGAGGA	
1367	CUCCUCGG	CUGAUGAG	X	CGAA	IGCCGCCA		TGGCGGCC	C	CCGAGGAG	
1368	CUCCUCGG	CUGAUGAG	X	CGAA	IGCCGCCC		GGGCGGCC	C	CGAGGAGG	
1369	UCCUCUCC	CUGAUGAG	X	CGAA	IGGGCCGC		GCGGCCCC	C	GAGGAGGA	
1382	GGGUCUGG	CUGAUGAG	X	CGAA	IUCUCCU		AGGAGGAC	A	CAGACCCC	
1384	CGGGGUCU	CUGAUGAG	X	CGAA	IUGUCUC		GAGGACAC	A	GCACCCCG	
1388	GCGACGGG	CUGAUGAG	X	CGAA	IUCUGUGU		ACACAGAC	C	CCGCTGCG	
1389	GGCGACGG	CUGAUGAG	X	CGAA	IGUCUGUG		CACAGACC	C	CCGTGCGC	
1390	AGGCGAGG	CUGAUGAG	X	CGAA	IGGUCUGU		ACAGACCC	C	GTGCGCTC	
1391	CAGGCGAC	CUGAUGAG	X	CGAA	IGGGUCUG		CAGACCCC	C	CGTCCCTG	
1397	CUGCACCA	CUGAUGAG	X	CGAA	ICGACGGG		CCCTGCGC	C	TGGTGACG	
1398	GCUGCACC	CUGAUGAG	X	CGAA	IGCGACGG		CCCTGCGC	T	GGTGACAG	
1404	GGAGCAGC	CUGAUGAG	X	CGAA	ICACCAAG		CCTGTGTC	A	GCTGCTCC	
1407	GGCGGAGC	CUGAUGAG	X	CGAA	ICUGCACC		GGTGACAG	T	GCTCCGCC	
1410	GCUGGGGG	CUGAUGAG	X	CGAA	ICAGCUGC		GCAGCTGC	T	CCGCGCAG	
1412	GUGCUGGC	CUGAUGAG	X	CGAA	IAGCAGCU		AGCTGCTC	C	GCCAGCAC	
1415	GCUGUGCU	CUGAUGAG	X	CGAA	ICGGAGCA		TGCTCCGC	C	AGCACAGC	
1416	UGCUGUGC	CUGAUGAG	X	CGAA	IGCGGAGC		GCTCCGCC	A	GCACAGCA	
1419	GGCUGGCG	CUGAUGAG	X	CGAA	ICUGGCGG		CCGCCAGC	A	CAGCAGCC	
1421	GGGGCGGC	CUGAUGAG	X	CGAA	IUGCUGGC		GCCAGCAC	A	GCAGCCCC	
1424	CCAGGGGC	CUGAUGAG	X	CGAA	ICUGUGCU		AGCACAGC	A	GCCCTGGG	
1427	CUGCCAGG	CUGAUGAG	X	CGAA	ICUGUGU		ACAGCAGC	C	CCTGGCAG	
1428	CUUGCCAG	CUGAUGAG	X	CGAA	IGCUGCUG		CAGCAGCC	C	CTGGCAGG	
1429	ACCUGCCA	CUGAUGAG	X	CGAA	IGGUGUGU		AGCAGCCC	C	TGGCAGGT	
1430	CACUUGCC	CUGAUGAG	X	CGAA	IGGGCUGC		GCAGCCCC	T	GGCAGGTG	
1434	CGUACACC	CUGAUGAG	X	CGAA	ICCAGGGG		CCCTGGGC	A	GGTGTACG	
1445	CCGACGJA	CUGAUGAG	X	CGAA	ICCGUACA		TGTACGGC	T	TCTGGCGG	
1456	CGCAGGCA	CUGAUGAG	X	CGAA	ICCCGCAC		GTGGCGGC	C	TGCTGCGC	
1457	GCGCAGGC	CUGAUGAG	X	CGAA	IGCCCGCA		TGCGGGGC	T	GCTTGCGC	
1460	CCGGCGCA	CUGAUGAG	X	CGAA	ICAGGGCC		GGGCTGTC	C	TGGCGCGC	
1461	GCGGGCGC	CUGAUGAG	X	CGAA	IGCAGGCC		GCTTGCGC	C	GGCTGGTG	
1466	CACCAAGC	CUGAUGAG	X	CGAA	IGCAGGCC		GGGCGGCT	C	TGGCGCGC	
1470	GGGGCACC	CUGAUGAG	X	CGAA	ICCGGCGC		GCTGGTGC	C	CCGAGGCC	
1476	GGCCUGGG	CUGAUGAG	X	CGAA	ICACCAAG		CTGGTGCC	C	CCAGGCCCT	
1477	AGGCUUGG	CUGAUGAG	X	CGAA	IGCAGGAG		TGGTGCCC	C	CAGGCCCT	
1478	GAGGCCUG	CUGAUGAG	X	CGAA	IGGCACCA		GGTGCCCC	C	AGGCTCTT	
1479	AGAGGCCU	CUGAUGAG	X	CGAA	IGGGCACC		GTGCCCCC	A	GGGCTCTG	
1480	CAGAGGCC	CUGAUGAG	X	CGAA	IGGGGCAC		CCGAGGCC	C	TCTGGGGC	
1484	GCCCCAGA	CUGAUGAG	X	CGAA	ICUUGGGG		CCGAGGCC	T	CTGGGGCT	
1485	AGCCCCAG	CUGAUGAG	X	CGAA	IGCCUGGG		CAAGGCTC	T	GGGCTTCC	
1487	GGAGCCCC	CUGAUGAG	X	CGAA	IAGGCCUG					

Table 14

1493	GUGCCUGG	CUGAUGAG	X	CGAA	ICCCAGAG			TCTGGGCG	T	CCAGGCAC	
1495	UUGUGCCU	CUGAUGAG	X	CGAA	IAGCCCCA			TGGGGCTC	C	AGGCACAA	
1496	GUUGCGCC	CUGAUGAG	X	CGAA	IAGCCCCC			GGGGCTCC	A	GGCACAAC	
1500	GUUGCGUG	CUGAUGAG	X	CGAA	ICUUGGAG			CTCCAGGC	A	CAAGCAAC	
1502	GGUUGCUU	CUGAUGAG	X	CGAA	IUGCCUGG			CCAGGCAC	A	ACGAAGC	
1511	GAGGAAGC	CUGAUGAG	X	CGAA	ICGUUUCU			ACGAAGCC	C	GCTTCCTC	
1514	CCUGAGGA	CUGAUGAG	X	CGAA	ICGGCGUU			AACGCCGC	T	TCCTCAGG	
1517	GUUCCUGA	CUGAUGAG	X	CGAA	IAGCGGCG			GCGGCTTC	C	TCAGGAAC	
1518	UGUUCUUG	CUGAUGAG	X	CGAA	IGAAGCGG			CGGCTTCC	T	CAGGAACA	
1520	GGUUGUCC	CUGAUGAG	X	CGAA	IAGGAAGC			GCTTCTCT	A	GGAAACAC	
1526	CUUCUUGG	CUGAUGAG	X	CGAA	IUUCUUGA			TCAGGAAC	A	CCAGAGAAG	
1528	AACUUCUU	CUGAUGAG	X	CGAA	IUGUUCUU			AGGAACAC	C	AGAAGATT	
1529	GAACUUCU	CUGAUGAG	X	CGAA	IUGUUCUU			GGAACACC	A	AGAAGTTC	
1538	CAGGGAGA	CUGAUGAG	X	CGAA	TAACUUCU			AGAAGTTC	A	TCTCCCTG	
1541	CCCCAGGG	CUGAUGAG	X	CGAA	IAGGAACU			AGTTCTATC	T	CCCTGGGG	
1543	UUCCCCAG	CUGAUGAG	X	CGAA	IAGGAACU			TTCTATCTC	C	CTGGGCAA	
1544	CUUCCCCA	CUGAUGAG	X	CGAA	IGAGAUGA			TCATCTCC	C	TGGGGAAG	
1545	GCUCUCCC	CUGAUGAG	X	CGAA	IGAAGAUG			CATCTCCC	T	GGGGAAGC	
1554	GCUCUGCA	CUGAUGAG	X	CGAA	ICUUCUCC			GGGGAAGC	A	TGCCAAGC	
1558	GAGAGCUU	CUGAUGAG	X	CGAA	ICAUGCUU			AAGCATGC	C	AAGCTCTC	
1559	CGAGAGCU	CUGAUGAG	X	CGAA	IGAUGCUU			AGCATGCC	A	AGCTCTCG	
1563	GCAGCGAG	CUGAUGAG	X	CGAA	ICUUGGCA			TGCCAAGC	T	CTCGCTGC	
1565	CUGCAGCG	CUGAUGAG	X	CGAA	IAGCUUGG			CCAAGCTC	T	CGCTGCAG	
1569	GCUCUCCG	CUGAUGAG	X	CGAA	ICGAGAGC			GCTCTCGC	T	GCAGAGGC	
1572	UCAGCUCC	CUGAUGAG	X	CGAA	ICAGCGAG			CTCGCTGC	A	GGAGCTGA	
1578	UCCACGUC	CUGAUGAG	X	CGAA	ICUCCUGC			GCAGGAGC	T	GACGTGGA	
1604	CCAAGGCG	CUGAUGAG	X	CGAA	IUCCCGCA			TGCGGAGC	T	GGCTTGG	
1609	CGCAGCCA	CUGAUGAG	X	CGAA	ICGCGAGC			GACTGGGC	T	TGGCTGGG	
1614	UCCUGGCG	CUGAUGAG	X	CGAA	TCCAAGCG			CGCTTGGC	T	GCGCAGGA	
1619	UGGGCUCC	CUGAUGAG	X	CGAA	ICGCGAGC			GGCTGGGC	A	GGAGCCCA	
1625	AACCCUUG	CUGAUGAG	X	CGAA	ICUCCUGC			GCAGGAGC	C	CAGGGGTT	
1626	CAACCCCU	CUGAUGAG	X	CGAA	TGCUCCUG			CAGGAGCC	C	AGGGGTGG	
1627	CCAACCCC	CUGAUGAG	X	CGAA	IGGCUCCU			AGGAAGCC	A	GGGGTTGG	
1637	CGGAACAC	CUGAUGAG	X	CGAA	ICCAACCC			GGGTGGGC	T	TGTTCCCG	
1644	CUGCGGCC	CUGAUGAG	X	CGAA	TAACACAG			CTGTGTTC	C	GGCGCAGC	
1648	UGCUUGGC	CUGAUGAG	X	CGAA	ICGGGAAC			GTTCCGGC	C	GCAGAGCA	
1651	CGUUGCUU	CUGAUGAG	X	CGAA	ICGGCGCG			CCGGCCGC	A	GAGCACCG	
1656	GCAGACGG	CUGAUGAG	X	CGAA	ICUCUGGC			GCAGAGGC	A	CCGTCTGC	
1658	ACGACAGC	CUGAUGAG	X	CGAA	IUGUCUGG			CAGAGGCC	C	GTCTGGGT	
1662	CCUCACGC	CUGAUGAG	X	CGAA	IACGUGGC			GCACCGTC	T	GGGTGAGG	
1676	CUUGGCCA	CUGAUGAG	X	CGAA	TAUCUCCU			AGGAGATC	C	TGGCCAAG	
1677	ACUUGGCC	CUGAUGAG	X	CGAA	IGAUCUCC			GGAGATCC	T	GGCCAAGT	
1681	AGGAACUU	CUGAUGAG	X	CGAA	ICCAAGAU			ATCTGTGC	C	AAGTTCTT	
1682	CAGGAACU	CUGAUGAG	X	CGAA	TGCCAGGA			TCCTGGCC	A	AGTTCTCT	
1688	CCAGUGCA	CUGAUGAG	X	CGAA	TAACUUGG			CCAAGTTC	C	TGCACTGG	
1689	GCCAGUGC	CUGAUGAG	X	CGAA	IGAACUUG			CAAGTTCC	T	GCACCTGC	
1692	UCAGCCAG	CUGAUGAG	X	CGAA	ICAGGAAC			GTTCTGTC	A	CTGGCTGA	

Table 14

1694	CAUCAGCC CUGAUGAG X CGAA IUCAGGA		TCCTGCAC T GGCTGATG	
1698	CACUCAUC CUGAUGAG X CGAA ICCAGUGC		GCATCGGC T GATGAGTG	
1722	ACCUGAGC CUGAUGAG X CGAA ICUCGAGC		CGTCGAGC T GCTCAGGT	
1725	AAGACCUG CUGAUGAG X CGAA ICAGCUCG		CGAGCTGC T CAGGTCTT	
1727	GAAGAGCC CUGAUGAG X CGAA IAGCAGCU		AGCTGCTC A GGTCTTTC	
1732	UAAAGAGAA CUGAUGAG X CGAA IACCUGAG		CTCAGGTC T TCTTTTAA	
1736	GACAUAAA CUGAUGAG X CGAA IAAAGACC		GGTCTTTC T TTTATGTC	
1745	GGUCCCGC CUGAUGAG X CGAA IACAUAAA		TTTATGTC A CGGAGACC	
1753	UGAAACGU CUGAUGAG X CGAA IUCUCCGU		ACGAGAGC C ACGTTTCA	
1754	UUGAAACG CUGAUGAG X CGAA IUCUCCGC		CGGAGACC A CGTTTCAA	
1761	UGUUCUUU CUGAUGAG X CGAA IAAACGUG		CACGTTTC A AAAGAACA	
1769	AAAGAGCC CUGAUGAG X CGAA IUUCUUUU		AAAAGAAC A GGCTCTTT	
1773	AGAAAGAG CUGAUGAG X CGAA ICCUGUIC		GAACAGGC T CTTTTCCT	
1775	GUAGAAAA CUGAUGAG X CGAA IAGCCUGU		ACAGGCTC T TTTTCTAC	
1781	CUUCCCGU CUGAUGAG X CGAA IAAAGAGA		TCTTTTTC T ACCGGAAG	
1784	ACUCUCC CUGAUGAG X CGAA IUAGAAAA		TTTTCTAC C GGAAGAGT	
1796	CUUCGUC CUGAUGAG X CGAA IACACUCU		AGAGTGTC T GGAGCAAG	
1802	UUGCAACU CUGAUGAG X CGAA ICUCACGA		TCTGAGGC A AGTGCAAC	
1809	CAAUUGUU CUGAUGAG X CGAA ICAACUUG		CAAGTTGC A AAGCATTG	
1814	GAUUCCAA CUGAUGAG X CGAA ICUUUGCA		TGCAAGGC A TTGGAATC	
1823	GUGCUGUC CUGAUGAG X CGAA IAUUCCAA		TTGGAATC A GACAGCAC	
1827	UCAAGUGC CUGAUGAG X CGAA IUCUGAUU		AATCAGAC A GCACCTTGA	
1830	UCUUCAG CUGAUGAG X CGAA ICUGUCUG		CAGACAGC A CTTGAAGA	
1832	CCUCUJCA CUGAUGAG X CGAA IUCUGUCU		GACAGCAC T TGAAGAGG	
1845	CCGCGAGC CUGAUGAG X CGAA ICACCCUC		GAGGTCGC A CTTGCGGG	
1848	GCUCCCGC CUGAUGAG X CGAA ICUCGACC		GGTGCAGC T GCGGGAGC	
1857	CUUCCGAC CUGAUGAG X CGAA ICUCCCGC		GCGGGAGC T GTCGGAAG	
1867	CUGACCUC CUGAUGAG X CGAA ICUUCCGA		TCGGAAGC A GAGTICAG	
1874	AUGCUGCC CUGAUGAG X CGAA IACCUCUG		CAGAGGTC A GGCAGCAT	
1878	CCCGAUGC CUGAUGAG X CGAA ICUCGACC		GGTCAGGC A GCATCGGG	
1881	CUUCCCGA CUGAUGAG X CGAA ICUUCCCG		CAGCGAGC A TCGGGAAG	
1891	GCGGGCCU CUGAUGAG X CGAA ICUUCCCG		CGGGAAGC C AGCCCGGC	
1892	GGCGGGCC CUGAUGAG X CGAA IGCUCUCC		GGGAAGCC A GGCCTGCC	
1896	GCAGGGCC CUGAUGAG X CGAA IGCUCGCU		AGCCAGCC C CGCCCTGC	
1897	AGCAGGGC CUGAUGAG X CGAA IGCUCGUC		GCCAGGCC C GCCCTGCT	
1900	GUACAGCA CUGAUGAG X CGAA ICGGGCCU		AGCCCTGC C CTGCTGAC	
1901	CGUCAGCA CUGAUGAG X CGAA ICGGGGCC		GGCCCGCC C TGCTGAGC	
1902	ACGUCAGC CUGAUGAG X CGAA IGGCGGGC		GCCCGCCC T GCTGAGCT	
1905	UGGACGUC CUGAUGAG X CGAA ICAGGGCG		CGCCCTGC T GAGCTCCA	
1912	CGGAGUCU CUGAUGAG X CGAA IACGUCAG		CTGACGTC C AGACTCCG	
1913	GCGAGUCU CUGAUGAG X CGAA IGACGUCA		TGACGTC C A GACTCCGC	
1917	UGAAGCGG CUGAUGAG X CGAA IUCUGGAC		GTCCAGAC T CCGCTTCA	
1919	GAUGAAGC CUGAUGAG X CGAA IAGUCUGG		CCAGACTC C GCTTCATC	
1922	GCGGAUGA CUGAUGAG X CGAA ICGGAGUC		GACTCCGC T TCATCCCC	
1925	CUUGGGGA CUGAUGAG X CGAA IAGGCGGA		TCCGCTTC A TCCTCAAG	
1928	AGGCTUGG CUGAUGAG X CGAA IAUAGAAG		GCTTCATC C CCAGCCT	
1929	CAGGCUUG CUGAUGAG X CGAA IGAUGAAG		CTTCATCC C CAAGCCTG	

Table 14

1930	UCAGGCUU CUGAUGAG X CGAA IGGAUGAA		TTATCCCC C AAGCCTGA	
1931	GUCAGGCU CUGAUGAG X CGAA IGGAUGAA		TCATCCCC A AGCCTGAC	
1935	GCOCGUCA CUGAUGAG X CGAA ICUGGGG		CCCCAAGC C TGACGGGC	
1936	AGCCCGUC CUGAUGAG X CGAA IGCUUGGG		CCCAAGCC T GACGGGCT	
1944	UCGGCCGC CUGAUGAG X CGAA ICCGUGCA		TGACGGGC T GCGGCCGA	
1950	UCACAUCU CUGAUGAG X CGAA ICCGCAGC		GCTCGGGC C GATTGTGA	
1961	GUAGUCCA CUGAUGAG X CGAA IUUACAAA		TTGTGAAC A TGGACTAC	
1967	CACGACGU CUGAUGAG X CGAA IUCCAUGU		ACATGGAC T ACGTCGTG	
1981	AACGUUCU CUGAUGAG X CGAA ICUCCAC		GTGGGAGC C AGAAGCTT	
1982	GAACGUUC CUGAUGAG X CGAA IGCUCCCA		TGGGAGCC A GAACGTTC	
1991	IUUCUUGC CUGAUGAG X CGAA IAACGUUC		GAACGTTC C GCAGAGAA	
1994	CUUUUCUC CUGAUGAG X CGAA ICGGAACG		CGTTCGCG C GAGAAAG	
2008	AGACGUC CUGAUGAG X CGAA ICCUUCU		AAGAGGCC C GAGCGTCT	
2016	UCGAGGUG CUGAUGAG X CGAA IACGUCUG		CGAGCGTC T CACCTCGA	
2018	CCUCGAGG CUGAUGAG X CGAA IAGACGCU		AGCGTCTC A CCTCGAGG	
2020	ACCCUGCA CUGAUGAG X CGAA IUGAGAGG		CGTCTCAC C TCGAGGGT	
2021	CACCCUCG CUGAUGAG X CGAA IGUGAGAC		GTCTCACC T CGAGGGTG	
2035	CUGAACAG CUGAUGAG X CGAA ICCUUCAC		GTGAAGGC A CTGTTACG	
2037	CGCUGAAC CUGAUGAG X CGAA IUGCCUUC		GAAGGCAC T GTTCAAGC	
2042	GAGCACGC CUGAUGAG X CGAA IAACAGUG		CACGTGTC A GCGTGCTC	
2049	CGUAGUUG CUGAUGAG X CGAA ICACGUCG		CAGCGTGC T CACTACG	
2051	CUCGUAGU CUGAUGAG X CGAA IAGCACGC		GCGTGCTC A ACTACAG	
2054	CCGUCUGU CUGAUGAG X CGAA IUUGAGCA		TGCTCAAC T ACGAGCGG	
2072	GAGGCGGG CUGAUGAG X CGAA ICGCCCGC		CGCGCGGC C CGGCGCTC	
2073	GAAGGCGG CUGAUGAG X CGAA ICGCGCGC		GCAGCGCC C CGGCGTCC	
2074	AGGAGGCC CUGAUGAG X CGAA IGGGCGCG		CGGCGCCC C GGCCTCCT	
2078	GCCCAAGA CUGAUGAG X CGAA ICCGGGGC		GCCCGGCG C TCCTGGGC	
2079	CGCCAGGG CUGAUGAG X CGAA ICGCGGGG		CCCCGGCC T CCTGGGGG	
2081	GGCGCCCA CUGAUGAG X CGAA IAGGCGGG		CGGCGCTC C TGGCGGCC	
2082	AGGCGCCC CUGAUGAG X CGAA IAGGCGCG		CGGCGCTC T GGGCGGCT	
2089	AGCACAGA CUGAUGAG X CGAA ICGCCGAG		CTGGGCGC C TCTGTGCT	
2090	CAGCACAG CUGAUGAG X CGAA ICGGCCCA		TGGGCGCC T CTGTGTGT	
2092	CCAGCAC CUGAUGAG X CGAA IAGGCGCC		GGCGCTC T GTGCTGGG	
2097	CCAGGCCC CUGAUGAG X CGAA ICACAGAG		CTCTGTGC T GGGCTGCG	
2102	AUCGUCCA CUGAUGAG X CGAA ICCACAGA		TGCTGGGC C TGGACGAT	
2103	UAUCGUCC CUGAUGAG X CGAA IGCCACGC		GCTGGGCG T GGAAGATA	
2114	GGCCUGU CUGAUGAG X CGAA IAUUUCGU		ACGATATC C ACAGGGCC	
2115	AGGCCUUG CUGAUGAG X CGAA IGAUUCGU		CGATATCC A CAGGGCCT	
2117	CCAGGCC CUGAUGAG X CGAA IUGGAU		ATATCCAC A GGGCTGGG	
2122	GUGCGCCA CUGAUGAG X CGAA ICCUUGUG		CACAGGGC C TGGCGCAC	
2123	GGUGCGCC CUGAUGAG X CGAA IGCCUUGU		ACAGGGCC T GGGCGACC	
2129	CACGAAGG CUGAUGAG X CGAA ICGCCAGG		CCTGGGCG C CCTCTGTG	
2131	AGCACGAA CUGAUGAG X CGAA IUGCGCCA		TGGCGCAC C TCGTGTCT	
2132	CAGCACGA CUGAUGAG X CGAA IGUGCGCC		GGCGCAC T TCGTGCTG	
2139	GCACAGCG CUGAUGAG X CGAA ICACGAAG		CTTCGTGC T GCGTGTGC	
2152	GGUCCUG CUGAUGAG X CGAA ICCCGCAC		GTGCGGGC C CAGGACCC	
2153	CGGGUCCU CUGAUGAG X CGAA IGCCCGCA		TGCGGGCC C AGGACCCG	

Table 14

2154	GCGGGUCC CUGAUGAG X CGAA IG9CCCCG	GCGGGCCC A GGACCCGC	
2159	AGCGCGCG CUGAUGAG X CGAA IUCCUGGG	CCAGGAC C CGCCGCT	
2160	CAGCGGCG CUGAUGAG X CGAA IGUCUGGG	CCAGGACC C GCGCGCTG	
2163	GCUCAGCG CUGAUGAG X CGAA ICGGUGCC	GGACCCGC C GCCTGAGC	
2166	ACAGCUC A CUGAUGAG X CGAA ICGCGGG	CCCGCGCG C TGAGCTGT	
2167	UACAGCUC CUGAUGAG X CGAA ICGCGGGG	CCGCGGCC T GAGCTGT A	
2172	CAAGAUAC CUGAUGAG X CGAA ICUCAGGC	GCCTGAGC T GTACTTTG	
2177	CUUGACAA CUGAUGAG X CGAA IUACAGCU	AGCTGTAC T TTGTCAAG	
2183	AUCCACCU CUGAUGAG X CGAA IACAAGU	ACTTTGT C A AGGTGGAT	
2210	GGGGAUGG CUGAUGAG X CGAA IUCGAGC	CGTACGAC A CCATCCCC	
2212	UGGGGAU CUGAUGAG X CGAA IUGGCUA	TACGACAC C ATCCCCCA	
2213	CUGGGGA CUGAUGAG X CGAA IGUGGCU	ACGACACC A TCCCCAC	
2216	GUCCUGG CUGAUGAG X CGAA IAUUGGU	ACACCATC C CCCAGGAC	
2217	UGUCCUG CUGAUGAG X CGAA IGAUGGU	CACCATCC C CCAGGACA	
2218	CUGUCCUG CUGAUGAG X CGAA IGAUGGU	ACCATCCC C CAGGACAG	
2219	CCUGUCCU CUGAUGAG X CGAA IGGGAUGG	CCATCCCC C AGGACAGG	
2220	GCCUGUCC CUGAUGAG X CGAA IGGGAUG	CATCCCCC A GGACAGGC	
2225	CGUGAGCC CUGAUGAG X CGAA IUCCUGG	CCCAGGAC A GGCTCAG	
2229	CCUCGUG CUGAUGAG X CGAA ICCUGUCC	GGACGAGC T CACGGAGG	
2231	GACCUCG CUGAUGAG X CGAA IAGCCUGU	ACAGGCTC A CGGAGGT	
2240	GCUGGCGA CUGAUGAG X CGAA IACCUCG	CGGAGGTC A TCGCCAGC	
2245	AUGAUGCU CUGAUGAG X CGAA ICGAUGAC	GTCACTGC C AGCATCAT	
2246	GAUGAUGC CUGAUGAG X CGAA ICGGAUGA	TCATCGCC A GCATCATC	
2249	UUUGAUGA CUGAUGAG X CGAA IUGGCGA	TCCGAGC A TCATCAA	
2252	GGGUUGA CUGAUGAG X CGAA IAUUGG	CCAGCATC A TCAACCC	
2255	CUGGGGU CUGAUGAG X CGAA IAUUGGC	GCATCATC A AACCCAG	
2259	UGUUCUG CUGAUGAG X CGAA IUUUGAU	CATCAAC C CCAGACA	
2260	GUGUUCUG CUGAUGAG X CGAA IGUUGAU	ATCAAAAC C CAGAACAC	
2261	CUGUUCU CUGAUGAG X CGAA IGUUGA	TCAAAACC C AGAACAG	
2262	ACGUGUCC CUGAUGAG X CGAA IGGUUG	CAAAACCC A GAACAGT	
2267	GCAGUACG CUGAUGAG X CGAA IUUCUGG	CCCAGAAC A CGTACTGC	
2273	ACGACGC CUGAUGAG X CGAA IUACGUGU	ACACGTAC T GCGTGGT	
2290	UGGACCAC CUGAUGAG X CGAA ICAUACG	CGGTATGC C GTGTCCA	
2297	GGCCUUCU CUGAUGAG X CGAA IACCAGG	CCGTGGTC C AGAAGGC	
2298	CGCCUUC CUGAUGAG X CGAA IGACCAG	CGTGTGCC A GAAAGCC	
2305	CCAUGGAC CUGAUGAG X CGAA ICCUUCG	CAGAAGGC C GCCCATGG	
2308	UGCCCAUG CUGAUGAG X CGAA ICGGCCU	AAGGCCGC C CATGGCA	
2309	GUCCCAU CUGAUGAG X CGAA ICGGCCU	AGGCCGCC C ATGGGAC	
2310	CGUCCCA CUGAUGAG X CGAA ICGGCCU	GGCCGCC C TGGGACG	
2316	UGCGGACG CUGAUGAG X CGAA ICCCAUGG	CCATGGGC A CGTCCGA	
2321	GGCCUUC CUGAUGAG X CGAA IACGUGC	GGCACGTC C GCAAGGCC	
2324	GAAAGCCU CUGAUGAG X CGAA ICGGACGU	ACGTCCGC A AGGCTTC	
2329	CUUUGAA CUGAUGAG X CGAA ICCUUGC	CGCAAGGC C TTCAGAG	
2330	GCUCUGA CUGAUGAG X CGAA IGCUCUG	GCAAGGCC T TCAAGAGC	
2333	GUGGUCU CUGAUGAG X CGAA IAAAGCCU	AGGCTTC A AGAGCAC	
2339	AGAGACGU CUGAUGAG X CGAA ICUCUGA	TCAAGAGC C ACGTCTCT	
2340	UAGAGACG CUGAUGAG X CGAA IGCUCUG	CAAGAGCC A CGTCTCTA	

Table 14

2345	CAAGGUAG CUGAUGAG X CGAA IACGUGGC	GCCACGTC T CTACCTTG
2347	GUCAAGGU CUGAUGAG X CGAA IAGACGUG	CACGTCTC T ACCTTGAC
2350	UCUGUCA CUGAUGAG X CGAA IUAGAGAC	GTCTCTAC C TTGACAGA
2351	GUCUGUCA CUGAUGAG X CGAA IGUAGAGA	TCTCTACC T TGACAGAC
2356	UGAGGUC CUGAUGAG X CGAA IUCAAGGU	ACCTTGAC A GACCTCA
2360	CGGCUGA CUGAUGAG X CGAA IUCUGUCA	TGACAGAC C TCACGCG
2361	ACGGCUG CUGAUGAG X CGAA IGUCUGUC	GACAGACC T CCAGCGT
2363	GUACGCU CUGAUGAG X CGAA IAGGUCUG	CAGACCTC C AGCCGTAC
2364	UGUACGGC CUGAUGAG X CGAA IAGGUCU	AGACCTCC A GCGGTACA
2367	GCAUGUAC CUGAUGAG X CGAA ICUGGAGG	CCTCCAGC C GTACATGC
2372	CUGUCGA CUGAUGAG X CGAA IUACGGCU	AGCGGTAC A TCGACAG
2379	CCACGAAC CUGAUGAG X CGAA IUCGCAU	CATGCGAC A GTTGTGG
2389	UGCAGGUG CUGAUGAG X CGAA ICCACGAA	TTGTTGGC T CACCTGCA
2391	CCUGCAGG CUGAUGAG X CGAA IAGCCAGC	CGTGGCTC A CCTGCAGG
2393	CUCUGCA CUGAUGAG X CGAA IUGAGCCA	TGGCTCAC C TCGAGGAG
2394	UCUCUCC CUGAUGAG X CGAA IGUGAGCC	GGCTCAC T GCAGSAGA
2397	UGGUCUCC CUGAUGAG X CGAA ICAGGUGA	TCACCTGC A GAGACCA
2404	AGCGGCU CUGAUGAG X CGAA IUCUCCUG	CAGGAGAC C AGCCCGT
2405	CAGCGGC CUGAUGAG X CGAA IGUCUCCU	AGGAGACC A GCGCGTG
2408	CCUCAGCG CUGAUGAG X CGAA ICUGGUU	AGACCAGC C CGTGAGG
2409	CCUCAGC CUGAUGAG X CGAA IGUCGGUC	GACGAGC C GCTGAGG
2412	CAUCCUC CUGAUGAG X CGAA ICGGCGUG	CAGCCCG T GAGGATG
2422	AUGACGAC CUGAUGAG X CGAA ICAUCCU	AGGATGC C GTGTCAT
2429	CUGUCGA CUGAUGAG X CGAA IACGACG	CCGTGTC A TCGAGCAG
2436	AGGAGCU CUGAUGAG X CGAA ICUCGAUG	CATCGAGC A GAGCTCT
2441	CAGGAGG CUGAUGAG X CGAA ICUCUGCU	AGCAGAGC T CCTCCTG
2443	IUUCAGGA CUGAUGAG X CGAA IAGCUCUG	CAGAGCTC C TCCGTAA
2444	AUUCAGGG CUGAUGAG X CGAA IAGGCUU	AGAGCTTC T CCTGAAT
2446	UCAUUCAG CUGAUGAG X CGAA IAGGAGCU	AGCTCTCC C CTGAATGA
2447	CUCAUUA CUGAUGAG X CGAA IAGGAGC	GCTCTCC C TGAATGAG
2448	CCUCAUUC CUGAUGAG X CGAA IAGGAGG	CTCCTCCC T GAATGAGG
2458	CCACUGCU CUGAUGAG X CGAA ICCUCAU	AATGAGGC C AGCAGTG
2459	GCCACUG CUGAUGAG X CGAA IGCCUCAU	ATGAGGCC A GCACTGC
2462	GAGGCCAC CUGAUGAG X CGAA ICUGGCCU	AGGCCAGC A GTGCCCTC
2468	GUCGAAGA CUGAUGAG X CGAA ICCACUGC	GCACTGAC C TCCTGAC
2469	CGUGAAG CUGAUGAG X CGAA IGCCACUG	CAGTGGCC T CTTCGAGC
2471	GACGUGCA CUGAUGAG X CGAA IAGGCCAC	GTGGCCTC T TCGAGTC
2480	CGGUAGGA CUGAUGAG X CGAA IACGUGCA	TCGAGCTC T TCCTAGC
2483	GAAGCGUA CUGAUGAG X CGAA IAGAGCG	ACGTCTTC C TAGCTTC
2484	UGAAGCGU CUGAUGAG X CGAA IGAAGAGC	CGTCTTCC T AGCTTCA
2489	GCACAUCA CUGAUGAG X CGAA ICGUAGGA	TCCTAGCC T TCATGTG
2492	GUGGCACA CUGAUGAG X CGAA IAAAGGUA	TACGCTTC A TGTGCAC
2498	GCGUGGU CUGAUGAG X CGAA ICACAUCA	TCATGTGC C ACCACGCC
2499	CGCGUGG CUGAUGAG X CGAA IGCACAU	CATGTGCC A CCACGCCG
2501	CACGCGU CUGAUGAG X CGAA IUGGCACA	TGTGCCAC C AGCCCGTG
2502	GCACGCG CUGAUGAG X CGAA IGUGGCAC	GTGCCACC A CGCGTGC
2506	AUGCGCAC CUGAUGAG X CGAA ICGUGUG	CACCAAGC C GTGCGCAT

Table 14

2513	GCCCCUGA	CUGAUGAG	X	CGAA	ICCCACGG		CCGTGGCG	A	TCAGGGGC	
2516	CUGGCCCC	CUGAUGAG	X	CGAA	IAUGCGCA		TGCGCATC	A	GGGCGAAG	
2522	GUAGGACU	CUGAUGAG	X	CGAA	ICCCUGA		TCAGGGGC	A	AGTCTTAC	
2527	UGGACGUA	CUGAUGAG	X	CGAA	IACUUGCC		GGCAAGTC	C	TACGTCCA	
2528	CUGGACGU	CUGAUGAG	X	CGAA	IGACUUGC		GCAAGTCC	T	AGTCCAG	
2534	CUGGACU	CUGAUGAG	X	CGAA	IACGUAGG		CCTACGTC	C	AGTCCAG	
2535	CCUUGCAC	CUGAUGAG	X	CGAA	IGACGUAG		CTAGCTCC	A	GTGCCAGG	
2540	GAUCCCU	CUGAUGAG	X	CGAA	ICACUGGA		TCCAGTGC	C	AGGGGATC	
2541	GAUCCCC	CUGAUGAG	X	CGAA	IGCACUGG		CCAGTGCC	A	GGGGATCC	
2549	GCCCCGG	CUGAUGAG	X	CGAA	IAUGCCCU		AGGGGATC	C	GCAGGGGC	
2550	AGCCUCC	CUGAUGAG	X	CGAA	IGAUCCCC		GGGGATCC	C	GCAGGGCT	
2553	UGGAGCCC	CUGAUGAG	X	CGAA	ICGGGAUC		GATCCCGC	A	GGGTCACA	
2558	GAGGAUGG	CUGAUGAG	X	CGAA	ICCCUGCG		CGCAGGSC	T	CCATCCTC	
2560	GAGAGGAU	CUGAUGAG	X	CGAA	IAGCCUG		CAGGGCTC	C	ATCCTCTC	
2561	GGAGAGGA	CUGAUGAG	X	CGAA	IGAGCCCU		AGGGCTCC	A	TCTCTTCC	
2564	CGUGAGA	CUGAUGAG	X	CGAA	IAUGGAGC		GCTCCATC	C	TCTCACAG	
2565	GCGUGAG	CUGAUGAG	X	CGAA	IGAUGGAG		CTCCATCC	T	CTCCACGC	
2567	CAGCGUGG	CUGAUGAG	X	CGAA	IAGGAUGG		CCATCTTC	T	CCAAGCTG	
2569	AGCAGCGU	CUGAUGAG	X	CGAA	IAGAGGAU		ATCTCTTC	C	AGCTGCTC	
2570	GAGCAGCG	CUGAUGAG	X	CGAA	IGAGAGGA		TCCTCTCC	A	CGCTGCTC	
2574	UGCAGAGC	CUGAUGAG	X	CGAA	ICGUGGAG		CTCCACGC	T	GCTCTGCA	
2577	GGCUGCAG	CUGAUGAG	X	CGAA	ICAGCGUG		CACGCTGC	T	CTGCAGCC	
2579	CAGGCGC	CUGAUGAG	X	CGAA	IAGCAGCG		CGCTGCTC	T	GCAGCCTG	
2582	GCACAGGC	CUGAUGAG	X	CGAA	ICAGAGCA		TGCTCTGC	A	GCCTGTGC	
2585	GUAGCACA	CUGAUGAG	X	CGAA	ICUGCAGA		TCTGCAGC	C	TGTGCTAC	
2586	CGUAGCAC	CUGAUGAG	X	CGAA	IGCUGCAG		CTGCAGCC	T	GTGCTACG	
2591	GUCCCGU	CUGAUGAG	X	CGAA	ICACAGGC		GCCTGTGC	T	ACGGCGAC	
2600	GUUCUCA	CUGAUGAG	X	CGAA	IUCGCCU		ACGGCGAC	A	TGGAGAAC	
2609	AAACAGCU	CUGAUGAG	X	CGAA	IUUCUCA		TGGAGAAC	A	AGCTGTIT	
2613	CCGCAAC	CUGAUGAG	X	CGAA	ICUUGUUC		GAACAAAG	T	GTTTGGCG	
2640	GCAGGAGC	CUGAUGAG	X	CGAA	ICCCGUCC		GGACGGGC	T	GCTCTGTC	
2643	AACGACGG	CUGAUGAG	X	CGAA	ICAGCCCG		CGGGCTGC	T	CCTGCGTT	
2645	CAACCGCA	CUGAUGAG	X	CGAA	IAGCAGCC		GGCTGCTC	C	TGGGTTTG	
2646	CCAAACGC	CUGAUGAG	X	CGAA	IGAGCAGC		GCTGCTCC	T	GGGTTTGG	
2666	CACCAACA	CUGAUGAG	X	CGAA	IAAAUCAU		ATGATTTT	T	TGTGGTGG	
2677	AGGUGAGG	CUGAUGAG	X	CGAA	IUCACCAA		TTGGTGAC	A	CCTCACCT	
2679	UGAGGUGA	CUGAUGAG	X	CGAA	IUGUCACC		GGTGACAC	C	TACCTTCA	
2680	GUGAGGUG	CUGAUGAG	X	CGAA	IUGUCACC		GTGACACC	T	CACCTCAC	
2682	GGGUGAGG	CUGAUGAG	X	CGAA	IAGGUGUC		GACACCTC	A	CCTCACCC	
2684	GUGGUGA	CUGAUGAG	X	CGAA	IUGAGGUG		CACCTCAC	C	TACCCAC	
2685	CGUGGUGU	CUGAUGAG	X	CGAA	IUGAGGUG		ACCTCAC	T	ACCCACG	
2687	CGGUGGG	CUGAUGAG	X	CGAA	IAGGUGAG		CTCACCTC	A	CACACCG	
2689	IUCGCGUG	CUGAUGAG	X	CGAA	IUGAGGUG		CACCTCAC	C	CACGCGAA	
2690	IUCGCGU	CUGAUGAG	X	CGAA	IUGAGGUG		ACCTCAC	C	ACCGGAAA	
2691	IUCGCGG	CUGAUGAG	X	CGAA	IUGAGGAG		CCTCAC	A	CGCGAAA	
2701	IUGAGGAA	CUGAUGAG	X	CGAA	IUUUCGCG		GGGAAAC	C	TTCTCAG	
2702	CCUGAGGA	CUGAUGAG	X	CGAA	IUUUCGCG		CGAAAAC	T	TCCTCAGG	

Table 14

2705	GGUCCUGA CUGAUGAG X CGAA IAAGGUUU		AAACCTTC C TCAGGACC	
2706	GGGUCCUG CUGAUGAG X CGAA IGAAGGUU		AACCTTCC T CAGGACCC	
2708	CAGGGUCC CUGAUGAG X CGAA IAGGAAGG		CCTTCTCC A GGACCCCTG	
2713	CGGACCAG CUGAUGAG X CGAA IUCCUGAG		CTCAGGAC C CTGGTCCG	
2714	UCGGACCA CUGAUGAG X CGAA IGUCCUGA		TCAGGACC C TGOTCCGA	
2715	CUCGGACC CUGAUGAG X CGAA IGGUCCUG		CAGGACCC T GGTCCGAG	
2720	GACACCUC CUGAUGAG X CGAA IACCAGGG		CCCTGTGC C GAGGTGTC	
2729	AUACUCAG CUGAUGAG X CGAA IACACCUC		GAGGTGTC C CTGAGTAT	
2730	CAUACUCA CUGAUGAG X CGAA IGACACCU		AGGTGTCC C TGAGTATG	
2731	CCAUAUCU CUGAUGAG X CGAA IGGACACC		GGTGTCCC T GAGTATGG	
2741	CACCACGC CUGAUGAG X CGAA ICCAUAUCU		AGTATGTC T GCGTGGTG	
2753	CUUCCGCA CUGAUGAG X CGAA IUUCACCA		TGOTGAAC T TGCGGAAG	
2764	IUCACCAC CUGAUGAG X CGAA IUUCUCCG		CGGAAGAC A GTGGTGAA	
2774	UACACGGA CUGAUGAG X CGAA IUUCACCA		TGGTGAAC T TCCCTGTA	
2777	IUCUACAG CUGAUGAG X CGAA IAAGUUAU		TGAATTC C CTGTAGAA	
2778	CUUCUACA CUGAUGAG X CGAA IGAAGUUC		GAACCTTC C TGTAAGAG	
2779	UCUUCUAC CUGAUGAG X CGAA IGAAGUUU		AACCTTCC T GTAGAAGA	
2794	CCACCCAG CUGAUGAG X CGAA ICCUCGUC		GACGAGGC C CTGGGTGG	
2795	GGCACCCA CUGAUGAG X CGAA IGCCUCUG		ACGAGGCC C TGGGTGGC	
2796	UGCCACCC CUGAUGAG X CGAA IGGCCUCG		CGAGGCC C TGGGTGGC	
2804	AAAAGCCG CUGAUGAG X CGAA ICCACCCA		TGGGTGGC A CGCTTTT	
2809	UGAACAAA CUGAUGAG X CGAA ICCGUGCC		GGCACGGC T TTTGTTC	
2817	CCGGCAUC CUGAUGAG X CGAA IAACAAAA		TTTTGTTC A GATGCCGG	
2823	CGUGGGCC CUGAUGAG X CGAA ICAUCUGA		TCAGATGC C GGCCACAG	
2827	AGGCCGUG CUGAUGAG X CGAA ICCGCAUC		ATGCCGGC C CACGGCCT	
2828	UAGGCCGU CUGAUGAG X CGAA IGCCGGCA		TGCCGGCC C ACGGCTTA	
2829	AUAGGCCG CUGAUGAG X CGAA IGGCCGGC		GCCGGCCC A CGGCCAT	
2834	GGGGAUA CUGAUGAG X CGAA ICCGUGGG		CCCACGGC T TATTCCTC	
2835	AGGGGAUA CUGAUGAG X CGAA IGCCGUGG		CCACGGCC T ATTCCCTT	
2840	GCACCAAG CUGAUGAG X CGAA IAAUAGGC		GCCTATTC C CCGTGTGC	
2841	CCACCAAG CUGAUGAG X CGAA IGAUAAGG		CCTATTC C CTGGTGGC	
2842	CCGCACCA CUGAUGAG X CGAA IGGAAUAG		CTATTCCT C TGGTGGCG	
2843	GCGCACCC CUGAUGAG X CGAA IGGGAUAU		TATTCCTC T GGTGGCGC	
2852	CAGCAGCA CUGAUGAG X CGAA ICCGACCC		GGTGGGCC C TGTGCTGT	
2853	CCAGCAGC CUGAUGAG X CGAA IGCCGCAC		GTGCGGCC T GCTGCTGT	
2856	UAUCCAGC CUGAUGAG X CGAA ICAGGCCG		CGGCTGTC T GGTGGATA	
2859	GGGUAUCC CUGAUGAG X CGAA ICAGCAGG		CCTGCTGC T GGATACCC	
2866	AGGGUCCG CUGAUGAG X CGAA IUAUCCAG		CTGATGAC C CGGACCTT	
2867	CAGGGUCC CUGAUGAG X CGAA IGAUAUCC		TGGATACC C GGACCTCT	
2872	ACCUCCAG CUGAUGAG X CGAA IUCCGGGU		ACCCGGAC C CTGGAGGT	
2873	CACCUCCA CUGAUGAG X CGAA IGUCCGGG		CCCGGACC C TGGAGGTG	
2874	GCACCUCC CUGAUGAG X CGAA IGGUCCGG		CCGAGCCC T GGAGGTGC	
2883	AGUCGCUC CUGAUGAG X CGAA ICACCUCC		GGAGGTGC A GAGCGACT	
2891	GCUGGAGU CUGAUGAG X CGAA IUCCGUCU		AGAGCGAC T ACTCCAGC	
2894	AUAGCUGG CUGAUGAG X CGAA IUAGUCGC		GCGACTAC T CCAGCTAT	
2896	GCAUAGCU CUGAUGAG X CGAA IAGUAGUC		GACTACTC C AGCTATGC	
2897	GGCAUAGC CUGAUGAG X CGAA IGAUAGU		ACTACTCC A GCTATGCC	

Table 14

2900	CCGGGCAU CUGAUGAG X CGAA ICUGGAGU	ACTCCAGC T ATGCCCGG	
2905	GAGGUCCG CUGAUGAG X CGAA ICAUAGCU	AGCTATGC C CGGACCTC	
2906	GGAGGUCC CUGAUGAG X CGAA IGCAUAGC	GCTATGCC C GGACCTCC	
2911	CUGAUGGA CUGAUGAG X CGAA IUCCGGGC	GCCCGGAC C TCCATCAG	
2912	UCUGAUGG CUGAUGAG X CGAA IGUCCGGG	CCCGGACC T CCATCAGA	
2914	GCUCUGAU CUGAUGAG X CGAA IAGGUCCG	CGGACCTC C ATCAGAGC	
2915	GGUCUGUA CUGAUGAG X CGAA IGAGGUCC	GGACCTCC A TCAGAGCC	
2918	ACUGGCUC CUGAUGAG X CGAA IAUUGGAG	CCTCCATC A GAGCCAGT	
2923	GUGAGACU CUGAUGAG X CGAA ICUCUGAU	ATCAGAGC C AGTCTCAC	
2924	GGUGAGAC CUGAUGAG X CGAA IGCUCUGA	TCAGAGCC A GTCTCAC	
2928	UGAAGGUG CUGAUGAG X CGAA IACUGGCU	AGCCAGTC T CACCTTCA	
2930	GUUGAAGG CUGAUGAG X CGAA IAGACUGG	CCAGTCTC A CCTTCAAC	
2932	CGGUUGAA CUGAUGAG X CGAA IUGAGACU	AGTCTCAC C TTCACCCG	
2933	GCGGUGUA CUGAUGAG X CGAA IGUGAGAC	GTCTCAC T TCAACCCG	
2936	GCCGCGGU CUGAUGAG X CGAA IAAUGGUA	TCACCTTC A ACCGCGGC	
2939	GAAGCCGC CUGAUGAG X CGAA IUUGAAGG	CCTTCAAC C GCGGCTTC	
2945	AGCCUUGA CUGAUGAG X CGAA ICGCGGU	ACCGCGGC T TCAAGGCT	
2948	CCAGCCCU CUGAUGAG X CGAA IAAAGCCG	GCGGCTTC A AGGCTGGG	
2953	IUUCUCCC CUGAUGAG X CGAA ICCUUGAA	TTCAAGGC T GAGAGGAA	
2963	GCAGCGCA CUGAUGAG X CGAA IUUCUCCC	GGAGGAAC A TGGTGGC	
2972	AAAGAGUU CUGAUGAG X CGAA ICGACGCA	TGCGTCCG A AACTCTTT	
2976	CCCCAAAG CUGAUGAG X CGAA IUUUGCGA	TCGCAAAC T CTTGGGGG	
2978	GACCCCAA CUGAUGAG X CGAA IAGUUUGC	GCAAACTC T TTGGGGTC	
2987	CAGCCGCA CUGAUGAG X CGAA IACCCCAA	TTGGGGTC T TGGCGCTG	
2994	GACACUUC CUGAUGAG X CGAA TCCGCAAG	CTTGGCGC C GAAGTGTC	
3003	ACAGGCUU CUGAUGAG X CGAA IACACUUC	GAAGTGTC A CAGCCTGT	
3005	AAACAGGC CUGAUGAG X CGAA IUGACACU	AGTGTCAC A GCCTGTTT	
3008	CAGAAACA CUGAUGAG X CGAA ICUGUGAC	GTACAGC C TGTTTCTG	
3009	CCAGAAAC CUGAUGAG X CGAA IGCUGUGA	TCACAGC T GTTTCTGT	
3015	GCAAAUCC CUGAUGAG X CGAA IAAACAGG	CCTGTTTC T GATTTCG	
3024	UGUUCACC CUGAUGAG X CGAA ICAAAUCC	GGATTTCG A GGTGAACA	
3032	CUGGAGGC CUGAUGAG X CGAA IUUCACCU	AGGTGAAC A GCCTCCAG	
3035	CGUCUGGA CUGAUGAG X CGAA ICUGUUAU	TGAACAGC C TCACAGCG	
3036	CCGUCUGG CUGAUGAG X CGAA IGCUGUUC	GAACAGCC T CCAGACGG	
3038	CACCGUCU CUGAUGAG X CGAA IAGGCUGU	ACAGCCTC C AGACGGTG	
3039	ACACCGUC CUGAUGAG X CGAA IGAGGCUG	CAGCCTTC A GACGGTGT	
3050	GAUGUUGG CUGAUGAG X CGAA ICACACCG	CGGTGTGC A CCAACATC	
3052	UAGAUUUU CUGAUGAG X CGAA IUGCACAC	GTGTGCAC C AACATCTA	
3053	GUAGAUUU CUGAUGAG X CGAA IUGGCACA	TGTGCACC A ACATCTAC	
3056	CUUGUAGA CUGAUGAG X CGAA IUUGGUUC	GCACCAAC A TCTACAAG	
3059	GAUCUUGU CUGAUGAG X CGAA IAUUUUGG	CCAACATC T ACAGATC	
3062	GAGGAUUC CUGAUGAG X CGAA IUAGAUUU	ACATCTAC A AGATCTCT	
3068	CAGCAGGA CUGAUGAG X CGAA IAUUUUGU	ACAAGATC C TCCTGCTG	
3069	GCAGCAGG CUGAUGAG X CGAA IGAUCUUG	CAAGATCT T CCTGCTGC	
3071	CUGCAGCA CUGAUGAG X CGAA IAGGAUUC	AGATCTCC C TGCTGCAG	
3072	CCUGCAGC CUGAUGAG X CGAA IGAGGAUC	GATCTCTC T GCTGCAGG	
3075	ACGCCUGC CUGAUGAG X CGAA ICAGGAGG	CCTCTGCG T GCAGGCGT	

Table 14

3078	UGUACGCC CUGAUGAG X CGAA ICAGCAGG		CCTGCTGC A GGCGTACA
3086	GUGAAACC CUGAUGAG X CGAA IUACGCCU		AGGCGTAC A GGTTCAC
3093	CACAUGCG CUGAUGAG X CGAA IAAACCGU		CAGGTTTC A CGCATGTG
3097	AGCACACA CUGAUGAG X CGAA ICGUGAAA		TTTCAAGC A TGTGTGCT
3105	GGAGCUGC CUGAUGAG X CGAA ICACACAU		ATGTGTGC T GCAGCTCC
3108	AUUGGAGC CUGAUGAG X CGAA ICAGCACA		TGTGCTGC A GCTCCATC
3111	GAAAUUGG CUGAUGAG X CGAA ICUGCAGC		GCTGAGC T CCAATTC
3113	AUGAAUUG CUGAUGAG X CGAA IAGCUGCA		TGCACTCC C CATTTTCAT
3114	GAUGAAAU CUGAUGAG X CGAA IAGCUGCG		GCAGCTCC C ATTTTCATC
3115	UGAUGAAA CUGAUGAG X CGAA IGGAGCUG		CAGCTCCC A TTTTCATCA
3120	CUUGCUGA CUGAUGAG X CGAA IAAUUGGG		CCCATTTTC A TCAGCAAG
3123	AAACUUGC CUGAUGAG X CGAA IAUAAAAU		ATTTTCATC A GCAAGITT
3126	UCCAAACU CUGAUGAG X CGAA ICUGAUGA		TCATCAGC A AGTTTGA
3140	AAAUUGGG CUGAUGAG X CGAA IUUCUUCU		GGAAGAAC C CCACATTT
3141	AAAUUGUG CUGAUGAG X CGAA IGUUCUUC		GAAGAACC C CACATTTT
3142	AAAAUUGU CUGAUGAG X CGAA IGGUUCUU		AAGAACC C ACATTTT
3143	GAAAAAUG CUGAUGAG X CGAA TGGUUCU		AGAACCCC A CATTTTTC
3145	AGGAAAAA CUGAUGAG X CGAA IUGGGUUG		AACCCAC A TTTTTCCT
3152	GACGCGCA CUGAUGAG X CGAA TAAAAAUG		CATTTTTC C TGGCGTFC
3153	UGACGCGC CUGAUGAG X CGAA IGAAAAAU		ATTTTTC C TGGGTCAC
3161	GUCACAGA CUGAUGAG X CGAA IACGCGCA		TGCGGCTC A TCTCTGAC
3164	CGUGUCAG CUGAUGAG X CGAA IAUACGCG		GGTCATC T CTGACAGC
3166	GCCGUGUC CUGAUGAG X CGAA IAGUAGAC		GTCTCTC T GACACGGC
3170	GGAGGCGG CUGAUGAG X CGAA IUCACAGA		TCTCTGAC A GGGCTCC
3175	CAGAGGGA CUGAUGAG X CGAA TCCGUGUC		GACACGGC C TCCCTCTG
3176	GCAGAGGG CUGAUGAG X CGAA TGGCGUGU		ACACGGCC T CCCTCTGC
3178	UAGCAGAG CUGAUGAG X CGAA TAGGCGGU		ACGGCTCT C CTCTGCTA
3179	GUAGCAGA CUGAUGAG X CGAA IAGGCGCG		CGGCTCTC C TCTGCTAC
3180	AGUAGCAG CUGAUGAG X CGAA TGGAGGCC		GGCTCTCC T CTGCTACT
3182	GGAGUAGC CUGAUGAG X CGAA TAGGGAGG		CCTCCCTC T GCTACTCC
3185	GAUGGAGU CUGAUGAG X CGAA ICAGAGGG		CCCTCTGC T ACTCCATC
3188	CAGGAGUG CUGAUGAG X CGAA IUAGCAGA		TCTGCTAC T CCATCTGT
3190	UUCAGGAG CUGAUGAG X CGAA IAGUAGCA		TGCTACTC C ATCTGAA
3191	UUUCAAGA CUGAUGAG X CGAA IAGUAGCC		GCTACTCC A TCCTGAA
3194	GGCUUUGA CUGAUGAG X CGAA IAUUGGAGU		ACTCCATC C TGAAGGCC
3195	UGCUUUGC CUGAUGAG X CGAA IAGUAGAG		CTCCATCC T GAAAGCCA
3202	GCGUUCU CUGAUGAG X CGAA ICUUUCAG		CTGAAAGC C AAGAACGC
3203	UGCUUUCU CUGAUGAG X CGAA ICGUUCU		TGAAAGCC A AGAACGA
3211	GACAUCCC CUGAUGAG X CGAA ICGUUCU		AGAACGC C GGGATGTC
3222	UGCCCCC CUGAUGAG X CGAA ICAGCAUC		GATGTGCT T GGGGGCCA
3229	GCGCCCU CUGAUGAG X CGAA TCCCCCA		CTGGGGGC C AAGGGGCG
3230	GGGGCCCU CUGAUGAG X CGAA TCCCCCA		TGGGGGCC A AAGGGGCC
3238	GGGGCGGC CUGAUGAG X CGAA TCGCCCU		AAGGGGCG C GCGGGGCC
3241	AGAGGGCC CUGAUGAG X CGAA TCGGGGCC		GGCGCCGC C GCGCTCT
3245	GGGCAGAG CUGAUGAG X CGAA TCGGGGCC		CGCGCCGC C CTCTGCC
3246	AGGGCAGA CUGAUGAG X CGAA TCGGGGCC		CGCGGGCC C TCTGCCCT
3247	GAGGGCAG CUGAUGAG X CGAA TCGGGGCC		GCGGGGCC T CTGGCTCT

Table 14

3249	CGGAGGGC	CUGAUGAG	X	CGAA	IAGGGCCG		CGGCCCTC	T	GGCCTCCG	
3252	CCUCGGAG	CUGAUGAG	X	CGAA	ICAGAGGG		CCCTCTGC	C	CTCCGAGG	
3253	GCCUCGGA	CUGAUGAG	X	CGAA	IGCAGAGG		CCTCTGCC	C	TCCGAGGC	
3254	GGCCUCGG	CUGAUGAG	X	CGAA	IGGCAGAG		CTCTGCCC	T	CCGAGGCC	
3256	ACGGCCUC	CUGAUGAG	X	CGAA	IAGGGCAG		CTGCCCTC	C	GAGGCCGT	
3262	CACUGCAC	CUGAUGAG	X	CGAA	ICCCUGGA		TCCGAGGC	C	GTGCAGTG	
3267	ACAGCCAC	CUGAUGAG	X	CGAA	ICACGGCC		GGCCCTGC	A	GTGGCTGT	
3273	GGUCCAC	CUGAUGAG	X	CGAA	ICACUGC		GCAGTGCC	T	GTGCCACC	
3278	UGCUUGGU	CUGAUGAG	X	CGAA	ICACAGCC		GGCTGTGC	C	ACCAGGCA	
3279	AUGCUUGG	CUGAUGAG	X	CGAA	IGCAGAGC		GCTGTGCC	A	CCAAGCAT	
3281	GAUUCUU	CUGAUGAG	X	CGAA	IUGGCACA		TGTGCCAC	C	AAGCATTC	
3282	GGAAUGCU	CUGAUGAG	X	CGAA	IUGGCAC		GTGCCACC	A	AGCATTC	
3286	AGCAAGAA	CUGAUGAG	X	CGAA	ICUUGGU		CACCAAGC	A	TTCTGTGT	
3290	CUUGAGCA	CUGAUGAG	X	CGAA	IAAUGCU		AAGCATTC	C	TGCTCAAG	
3291	GCUGAGC	CUGAUGAG	X	CGAA	IGAAUGCU		AGCATTC	T	GCTCAAGC	
3294	UCAGCUUG	CUGAUGAG	X	CGAA	ICAGGAAU		ATTCTGTC	T	CAAGCTGA	
3296	AGUCAGCU	CUGAUGAG	X	CGAA	IAGCAGGA		TCCTGCTC	A	AGCTGACT	
3300	GUUGAGC	CUGAUGAG	X	CGAA	ICUUGAGC		GCTCAAGC	T	GACTCGAC	
3304	CGUGUGC	CUGAUGAG	X	CGAA	IUCAGCUU		AAGCTGAC	T	GCACACCG	
3309	IUGACACG	CUGAUGAG	X	CGAA	IUCGAGUC		GACTGAC	A	CCGTGTCA	
3311	GGUGACAC	CUGAUGAG	X	CGAA	IUGUCGAG		CTCGACAC	C	GTGTCAAC	
3317	CACGUAGG	CUGAUGAG	X	CGAA	IACACGGU		ACCGTGTG	A	CCTACGTG	
3319	GGCACGUA	CUGAUGAG	X	CGAA	IUGACACG		CGTGTGAC	C	TACGTGCC	
3320	UGGCACGU	CUGAUGAG	X	CGAA	IUGAGCAC		GTGTCAAC	T	ACGTGCCA	
3327	CCAGGAGU	CUGAUGAG	X	CGAA	ICACGUAG		CTACGTGC	C	ACTCCTGG	
3328	CCCAGGAG	CUGAUGAG	X	CGAA	IGCAGGUA		TACGTGCC	A	CTCCTGGG	
3330	ACCCACAG	CUGAUGAG	X	CGAA	IUGGCACG		CGTGCACC	T	CTGTGGGT	
3332	UGACCCCA	CUGAUGAG	X	CGAA	IAGTGGCA		TGCCACTC	C	TGGGGTCA	
3333	GUGACCCC	CUGAUGAG	X	CGAA	IGAGUGGC		GCCACTCC	T	GGGTCTAC	
3340	GUCCUGAG	CUGAUGAG	X	CGAA	IACCCACG		CTGGGGTC	A	CTCAGGAC	
3342	CUGUCCUG	CUGAUGAG	X	CGAA	IUGACCCC		GGGTCTAC	T	CAGGACAG	
3344	GGCUGUCC	CUGAUGAG	X	CGAA	IAGUGACC		GGTCACTC	A	GGACAGCC	
3349	GUCUGGGC	CUGAUGAG	X	CGAA	IUCCUGAG		CTCAGGAC	A	GCCCAGAC	
3352	UGCGUCUG	CUGAUGAG	X	CGAA	ICUGUCCU		AGGACAGC	C	CAGACGCA	
3353	CUGCGUCU	CUGAUGAG	X	CGAA	IGCUGUCC		GGACAGCC	C	AGACGCAG	
3354	GCUGCGUC	CUGAUGAG	X	CGAA	IGCGUGUC		GACAGCCC	A	GACGACGC	
3360	GACUCAGC	CUGAUGAG	X	CGAA	ICGUCUGG		CCAGACGC	A	GCTGAGTC	
3363	UCCGACUC	CUGAUGAG	X	CGAA	ICGUCGUC		GACGAGC	T	GAGTCGGA	
3375	UCCCCGGG	CUGAUGAG	X	CGAA	ICUUGCCA		TCGGAAGC	T	CCCGGGGA	
3377	CGUCCCCG	CUGAUGAG	X	CGAA	IAGCTUCC		GGAGCTTC	C	CGGGGACG	
3378	UCGUCCCC	CUGAUGAG	X	CGAA	IGAGCUUC		GAAGCTCC	C	GGGACGGA	
3390	GGGAGUC	CUGAUGAG	X	CGAA	ICGUGGUC		GACGACGC	T	GACTGCC	
3394	UCCAGGGC	CUGAUGAG	X	CGAA	IUCAGCGU		ACGCTGAC	T	GGCTGGA	
3397	GGCUCCAG	CUGAUGAG	X	CGAA	ICAGUCAG		CTGACTGC	C	CTGGAGGC	
3398	GGCCUCCA	CUGAUGAG	X	CGAA	IGCAGUCA		TGACTGCC	C	TGGAGGCC	
3399	CGGCTUCC	CUGAUGAG	X	CGAA	IGGCAGUC		GACTGCC	T	GGAGGCCG	
3406	UUGGCGUC	CUGAUGAG	X	CGAA	ICCUCCAG		CTGGAGGC	C	GCAGCCAA	

Table 14

3409	GGGUUGGC CUGAUGAG X CGAA ICGGCCUC	GAGGCGGC A GCCAACCC
3412	GCCGGGUU CUGAUGAG X CGAA ICUGCGGC	GCCCGAGC C AACC CGGC
3413	UGCCGGGU CUGAUGAG X CGAA ICUGCGGC	CCGCGAGC A ACCCGGCA
3416	CAGUGCGC CUGAUGAG X CGAA IUUGGCGU	CAGCCAAC C CGGCACG
3417	GCAGUGCC CUGAUGAG X CGAA IGUGGCGU	AGCCAAAC C GGCACGTC
3421	GAGGCGAG CUGAUGAG X CGAA ICGGGGUU	AACCGGCG A CTGCCCCC
3423	CUGAGGGC CUGAUGAG X CGAA IUGCCGGG	CCCGGCAC T GCCCTCAG
3426	AGUCUGAG CUGAUGAG X CGAA ICAGUGCC	GGCACGTC C CTCAGACT
3427	AAGUCUGA CUGAUGAG X CGAA IGAGUGGC	GCACGTC C CTCAGACT
3428	GAAGUCUG CUGAUGAG X CGAA IGGCAGUG	CACTGCCC T CAGACTTC
3430	UUGAAGUC CUGAUGAG X CGAA IAGGGCAG	CTGCCCTC A GACTTCAA
3434	GGUCUGAG CUGAUGAG X CGAA IUUGGAGG	CCTCAGAC T TCAAGACC
3437	GAUGGUCU CUGAUGAG X CGAA IAGUCUGU	CAGACTTC A AGACCATC
3442	UCCAGGAU CUGAUGAG X CGAA IUUCUGAA	TTCAAGAC C ATCTGGA
3443	GUCCAGGA CUGAUGAG X CGAA IGUCUGAA	TCAAGACC A TCTTGAC
3446	UCAGUCCA CUGAUGAG X CGAA IAUUGGUCU	AGACCATC C TGGACTGA
3447	AUCAGUCC CUGAUGAG X CGAA IGAUGGUC	GACCATCC T GGACTGAT
3452	UGGCCAUC CUGAUGAG X CGAA IUCCAGGA	TCTTGGAC T GATGGCCA
3459	GGCGGGGU CUGAUGAG X CGAA ICAUCAG	CTGATGCG C ACCCGCCC
3460	UGGGCGGG CUGAUGAG X CGAA IGCCAUCA	TGATGGCC A CCGGCCCA
3462	UGUGGGCG CUGAUGAG X CGAA IUGGCCAU	ATGGCCAC C CGCCACA
3463	CUGUGGGC CUGAUGAG X CGAA IGUGGCCA	TGGCCACC C CGCCACAG
3466	UGGCGUGU CUGAUGAG X CGAA ICGGGUUG	CCACCCGC C CACAGCCA
3467	CUGGCGUG CUGAUGAG X CGAA ICGGGGUG	CACCCGCC C ACAGCCAG
3468	CCUGGCGU CUGAUGAG X CGAA IGGGGGUG	ACCCGCC C CAGCCAGG
3470	GGCCUGGC CUGAUGAG X CGAA IUGGGCGG	CCGCCAC A GCCAGGCC
3473	CUCGGCCU CUGAUGAG X CGAA ICUGUGGG	CCACAGC C AGGCCGAG
3474	UCUGGGCC CUGAUGAG X CGAA IGCUGUGG	CCACAGCC A GGCCGAGA
3478	CUGGUCUC CUGAUGAG X CGAA ICCUGGCU	AGCCAGGC C GAGAGCAG
3485	CUGGUGUC CUGAUGAG X CGAA ICUCUGCG	CCGAGAGC A GACACGAG
3489	GCUGGUGG CUGAUGAG X CGAA IUUGGUCU	GAGCAGAC A CCGACAGC
3491	GGGCGUGU CUGAUGAG X CGAA IUGGUGCG	GCAGACAC C AGCAGCCC
3492	AGGGCGUC CUGAUGAG X CGAA IGUGGUGU	CAGACACC A CGAGCCCT
3495	GACAGGGC CUGAUGAG X CGAA ICUGGGUGU	ACACCAGC A GCCCTGTC
3498	CGUGACAG CUGAUGAG X CGAA ICUGGUGG	CCAGCAGC C CTGTACAG
3499	GCUGAGCA CUGAUGAG X CGAA IGCUGGUG	CAGCAGCC C TGTCACGC
3500	GGCGUGAC CUGAUGAG X CGAA IGGCUGCU	AGCAGCCC T GTACGCC
3504	GCCCGGCG CUGAUGAG X CGAA IACAGGGC	GCCCTGTC A CGCCGGGC
3508	UAGAGCCC CUGAUGAG X CGAA ICGUGACA	TGTCACGC C GGGCTCTA
3513	GGACGUAG CUGAUGAG X CGAA ICCGGGCG	CGCCGGGC T CTACTGCC
3515	UGGGACGU CUGAUGAG X CGAA IAGCCCGG	CCGGGCTC T ACCTCCCA
3521	CCUCCCGU CUGAUGAG X CGAA IACGUAGA	TCTACTGC C CAGGAGAG
3522	CCUCCCGU CUGAUGAG X CGAA IGACGUAG	CTACTGCC C AGGAGGG
3523	UCCCUCCC CUGAUGAG X CGAA IGGAGGUA	TACTGCCC A GGGAGGGA
3524	UGGGUGUG CUGAUGAG X CGAA ICCGCCCC	GGGCGGCG C CACACCCA
3541	CUGGGUGU CUGAUGAG X CGAA IGGCGCCC	GGGCGGCC C ACACCCAG
3542	CCUGGGUG CUGAUGAG X CGAA IGGCGGCC	GGGCGGCC C CACCCAGG

Table 14

3544	GGCCUGGG	CUGAUGAG	X	CGAA	IUGGGCCG	CGGCCAC	A	CCGAGCC	
3546	CGGCCUG	CUGAUGAG	X	CGAA	IUGGGCCG	GGCCACAC	C	CAGGCCG	
3547	GGGCCUG	CUGAUGAG	X	CGAA	IUGGGCCG	CCGACACC	C	AGGCCCG	
3548	UGGGGCC	CUGAUGAG	X	CGAA	IUGGGCCG	CCACACCC	A	GGGCCCG	
3552	GGGGGCC	CUGAUGAG	X	CGAA	IUGGGCCG	ACCCAGGC	C	CGACCGC	
3553	AGGGGCC	CUGAUGAG	X	CGAA	IUGGGCCG	CCGAGGCC	C	GCACCGC	
3556	CCGAGCCG	CUGAUGAG	X	CGAA	IUGGGCCG	AGGCCCGC	A	CGCTGGG	
3558	CUCGAGC	CUGAUGAG	X	CGAA	IUGGGCCG	GGCCGAC	C	CTGGGAG	
3561	AGACUCC	CUGAUGAG	X	CGAA	IUGGGCCG	GGCAGGC	T	GGAGTCT	
3569	CAGGCUC	CUGAUGAG	X	CGAA	IACUCCCA	TGGGAGT	T	GAGGCTG	
3575	CUCACUC	CUGAUGAG	X	CGAA	ICCUACA	TCTGAGC	C	TGAGTGA	
3576	ACUCACU	CUGAUGAG	X	CGAA	IGCCUCAG	CTGAGGC	T	GAGTGA	
3592	CAGGCCU	CUGAUGAG	X	CGAA	ICCAACA	TGTTGGC	C	GAGGCTG	
3598	GACAUCA	CUGAUGAG	X	CGAA	ICCUCCG	GGCAGGC	C	TGCTGTC	
3599	GGACUCC	CUGAUGAG	X	CGAA	IGCCUCG	CCGAGGCC	T	GCATGTC	
3602	GCCGACA	CUGAUGAG	X	CGAA	ICAGGCCU	AGGCTGC	A	TGCTGGC	
3607	CUUCAGC	CUGAUGAG	X	CGAA	IACAUGCA	TGCTGTC	C	GGCTGA	
3611	CAGCCUC	CUGAUGAG	X	CGAA	ICCGACA	TGTCGGC	T	GAAGGCT	
3618	GGACACU	CUGAUGAG	X	CGAA	ICCUACG	CTGAAGC	T	GAGTCTC	
3626	CCUAGCC	CUGAUGAG	X	CGAA	IACACUC	TGAGTCT	C	GGCTGAG	
3630	CAGCCUC	CUGAUGAG	X	CGAA	ICCGACA	TGTCCGC	T	GAAGGCT	
3636	CUCGACA	CUGAUGAG	X	CGAA	ICCUACG	GCTGAGC	C	TGAGGAG	
3637	ACUCGUC	CUGAUGAG	X	CGAA	IGCCUCG	CTGAAGC	T	GAGGCT	
3649	CCUAGGU	CUGAUGAG	X	CGAA	IACACUC	CGAGTCT	C	AGGAGG	
3650	CCUAGGC	CUGAUGAG	X	CGAA	IACACUC	GAGTCTC	A	GGAGG	
3653	CAGCCCU	CUGAUGAG	X	CGAA	ICUGACA	TGTCCAG	C	AGGCTG	
3654	UCAGCCU	CUGAUGAG	X	CGAA	IGCUAGC	GTCCAGC	A	AGGCTG	
3660	GGACACU	CUGAUGAG	X	CGAA	ICCUUGG	CCAAGGC	T	GAGTCTC	
3668	GGUGGCU	CUGAUGAG	X	CGAA	IACACUC	TGAGTCT	C	AGCAGC	
3669	AGGUGGC	CUGAUGAG	X	CGAA	IGACACU	GAGTCTC	A	GCACACT	
3672	GGCAGGU	CUGAUGAG	X	CGAA	ICUGACA	TGTCCAG	C	CACCTGC	
3674	ACGCGAG	CUGAUGAG	X	CGAA	IUGCUGA	TCCAGAC	A	CGTCCGT	
3676	AGACGCA	CUGAUGAG	X	CGAA	IUGGUGG	CAGCAC	C	TGCTCTT	
3677	AAGACGC	CUGAUGAG	X	CGAA	IUGGUGG	AGCACAC	T	GGCTCTT	
3680	GUGAAGC	CUGAUGAG	X	CGAA	ICAGGUG	ACACTGC	C	GTCTTAC	
3684	GGAAGUA	CUGAUGAG	X	CGAA	IACGGAG	CTGCGCT	T	TCACTTC	
3687	UGGGGAG	CUGAUGAG	X	CGAA	IAAGACG	CCGTCTT	C	CTTCCCA	
3689	UGGGGGA	CUGAUGAG	X	CGAA	IUGAAGC	GTCTTAC	T	TCCCCCA	
3692	GCCUGGG	CUGAUGAG	X	CGAA	IAGUGAA	TCACTTC	C	CAAGGCT	
3693	AGCCUGG	CUGAUGAG	X	CGAA	IAGUGAA	CACTTCC	C	CAAGGCT	
3694	CAGCCUG	CUGAUGAG	X	CGAA	IGGAAGG	ACTTCCC	A	CAGGCTG	
3695	CCAGCCU	CUGAUGAG	X	CGAA	IGGAAGG	TTCCCC	A	GGCTGGC	
3697	CGCCAGC	CUGAUGAG	X	CGAA	IUGGGGA	CCACAGC	T	GGGCTCG	
3701	CGAGCGC	CUGAUGAG	X	CGAA	ICCUUGG	GCTGGCG	T	GGGCTCA	
3707	UGAGCCG	CUGAUGAG	X	CGAA	ICCGAGC	CGCTGAG	T	CAACCCA	
3712	UGGGGUG	CUGAUGAG	X	CGAA	ICCGAGC	CTCGGCT	C	ACCCAGG	
3714	CCUGGGU	CUGAUGAG	X	CGAA	IAGCCAG				

Table 14

3715	CCCUGGG CUGAUGAG X CGAA IGAGCCGA	TCGGCTCC A CCCAGGG
3717	GGCCUCUG CUGAUGAG X CGAA IUOGAGCC	GGCTCCAC C CCAAGGCC
3718	UGGCCUG CUGAUGAG X CGAA IGUGGAGC	GGCTCCAC C CAGGCGCA
3719	CUGGCCCU CUGAUGAG X CGAA IGGUGAG	CTCCACCC C AGGCGCAG
3720	GCUGCCCC CUGAUGAG X CGAA IGGUGGA	TCACCCAC A GGGCCAGC
3725	GAAAAAGC CUGAUGAG X CGAA ICCUCUGG	CCAGGGCC C AGCTTTTC
3726	GGAAAAAGC CUGAUGAG X CGAA IGCCUCUG	CCAGGGCC A GCTTTTC
3729	UGAGGAAA CUGAUGAG X CGAA ICUGGCC	GGGCCAGC T TTCTCTCA
3734	CCUGGUGA CUGAUGAG X CGAA TAAAGCU	AGCTTTTC C TCACACAGG
3735	UCUGGUG CUGAUGAG X CGAA TGAAGAGC	GCTTTTTC T CACCAAGA
3737	GCUCUCUG CUGAUGAG X CGAA TCGGAAA	TTTCTCTC A CCAGGAGC
3739	GGGCUCCU CUGAUGAG X CGAA TUGAGGAA	TTCTCTAC C AGGAGCCC
3740	CGGCUCC CUGAUGAG X CGAA TUGAGGAA	TCCTCACC A GGAGCCCG
3746	GGAAGCCG CUGAUGAG X CGAA TCUCUCUG	CCAGGAGC C CGGCTTCC
3747	UGAAGCC CUGAUGAG X CGAA TCGUCUG	CAGGAGCC C GGCTTCCA
3751	GGAUGUGA CUGAUGAG X CGAA TCGGGCU	AGCCCGGC T TCCACTCC
3754	UGGGGAGU CUGAUGAG X CGAA TAAGCCGG	CGGGCTTC C ACTCCCCA
3755	GUGGGAG CUGAUGAG X CGAA TGAAGCCG	CGGCTTCC A CTCGCCAC
3757	AUGUGGG CUGAUGAG X CGAA TUGAAGC	GCTTCCAC T CCCCACAT
3759	CUAUGUG CUGAUGAG X CGAA TUGGAA	TTCCACTC C CCACATAG
3760	CUAUGUG CUGAUGAG X CGAA TUGGAA	TCCACTCC C CACATAGG
3761	UCCUAUG CUGAUGAG X CGAA TGGAGUG	CCACTCCC C ACATAGGA
3762	UCCUAUG CUGAUGAG X CGAA TGGAGUG	CCTCCCC A CATAGGAA
3764	UAUUCUA CUGAUGAG X CGAA TUGGGGAG	CTCCCCAC A TAGGAATA
3776	CUGGGAU CUGAUGAG X CGAA TACUAUUC	GAATAGTC C ATCCCCAG
3777	UCUGGGA CUGAUGAG X CGAA TACUAUUC	AATAGTCC A TCCCCAGA
3780	GAUUCUG CUGAUGAG X CGAA TAUUGACU	AGTCATTC C CCAGATTC
3781	CGAUUCUG CUGAUGAG X CGAA TAUUGAC	GTCCATCC C CAGATTCC
3782	GCGAAUCU CUGAUGAG X CGAA TGGAGGAA	TCCATCCC C AGATTCCG
3783	GGCGAAUC CUGAUGAG X CGAA TGGAGG	CCATCCCC A GATTCCGC
3791	UGAACAAU CUGAUGAG X CGAA TCGAAUCU	AGATTCCG C ATTGTTCA
3792	UGAACAAU CUGAUGAG X CGAA TCGAAUCU	GATTCCGC A TTGTTCC
3799	GCGAGGG CUGAUGAG X CGAA TAAACAAU	CATTGTTT A CCGCTCCG
3801	GCGAGGG CUGAUGAG X CGAA TUGAACAA	TTGTTTAC C CCGCGCCC
3802	AGGGCGAG CUGAUGAG X CGAA TUGAACAA	GTGTCACC C CTGCGCCT
3803	CAGGGCGA CUGAUGAG X CGAA TGGUAGAC	GTGTCACC C CTGCGCCT
3804	GCGAGGG CUGAUGAG X CGAA TGGUAGAA	TTACCCCC T CGCCCTGC
3808	GAGGGCAG CUGAUGAG X CGAA TCGAGGGG	CCCTCCGC C CTGCGCCT
3809	GAGGGCAG CUGAUGAG X CGAA TCGAGGGG	CCCTCCGC C CTGCGCCT
3810	AGGAGGCG CUGAUGAG X CGAA TGGCGAGG	CCTCGCCC T GCGCTCCT
3813	CAAGGAG CUGAUGAG X CGAA TCGGGCG	CGCCCTGC C CTGCTTTC
3814	GCAAGGAG CUGAUGAG X CGAA TCGAGGGC	GGCTTCCC C TCCTTTGC
3815	GCAAGGAG CUGAUGAG X CGAA TCGAGGGG	CCCTGCCC T CTTTTCGC
3817	AGGCGCAA CUGAUGAG X CGAA TGGGCGAG	TCGCGCTC C TTTGCTTC
3818	GAGGCGAA CUGAUGAG X CGAA TGGGCGAG	TCGCGCTC C TTTGCTTC
3823	GCGUGGAA CUGAUGAG X CGAA TCAAGGAA	TCCTTTGC C TCCACCCC
3824	GCGUGGAA CUGAUGAG X CGAA TCAAGGAG	CCTTTGCC T TCCACCCC

Table 14

3827	GUGGGGU CUGAUGAG X CGAA TAAGGCAA		TTGCCTTC C ACCCCCAC
3828	GGUGGGG CUGAUGAG X CGAA IGAAGGCA		TGCCTTCC A CCCCACCC
3830	AUGGUGG CUGAUGAG X CGAA IUGGAAGG		CCTTCCAC C CCCACCAT
3831	GAUGGUG CUGAUGAG X CGAA IGUGGAAG		CTTCCACC C CCACCATC
3832	GGAUGUG CUGAUGAG X CGAA IGGUGGAA		TTCCACCC C CACCATCC
3833	UGGAUGU CUGAUGAG X CGAA IGGUGGA		TCCACCCC C ACCATCCA
3834	CUGAUGG CUGAUGAG X CGAA IGGGUGG		CCACCCC C CCATCCAG
3836	ACCUGAU CUGAUGAG X CGAA IUGGGGU		ACCCCCAC C ATCCAGGT
3837	CACCUGGA CUGAUGAG X CGAA IUGGGGG		CCCCCACC A TCCAGGTG
3840	CUCCACCU CUGAUGAG X CGAA IAUUGUGG		CCACCATC C AGGTGGAG
3841	UCUCCACC CUGAUGAG X CGAA IGAUGGUG		CACCATCC A GGTGGAGA
3851	CUUCUCAG CUGAUGAG X CGAA IUCUCCAC		GTGGAGAC C CTGAGAAG
3852	CCUUCUCA CUGAUGAG X CGAA IGUCUCCA		TGGAGACC C TGAGAAGG
3853	UCCUUCUC CUGAUGAG X CGAA IGGUCUCC		GGAGACCC T GAGAAGGA
3863	GCUCCAG CUGAUGAG X CGAA IUCCUUCU		AGAAGGAC C CTGGAGGC
3864	AGCUCCCA CUGAUGAG X CGAA IGUCCUUC		GAAGGACC C TGGAGACT
3865	GAGCUCCC CUGAUGAG X CGAA IGGUCCUU		AAGGACCC T GGGAGCTC
3872	AUUCCCAG CUGAUGAG X CGAA ICUCCCA		CTGGAGC T CTGGAAAT
3874	AAAUCCC CUGAUGAG X CGAA TAGCUCCC		GGAGCTC T GGAATTT
3891	ACACCUU CUGAUGAG X CGAA IUCACUCC		GGAGTGAC C AAGGTGT
3892	CACACCU CUGAUGAG X CGAA IGUCACUC		GAGTGACC A AAGGTGT
3902	GUGUACAG CUGAUGAG X CGAA TCACACCU		AGGTGTGC C CTGTACAC
3903	UGUGUACA CUGAUGAG X CGAA TGCACACC		GGTGTGCC C TGTACACA
3904	CUGUGUAC CUGAUGAG X CGAA TGGCACAC		GTGTGCC T GTACACAG
3909	CUCGCCUG CUGAUGAG X CGAA TUACAGGG		CCCTGTAC A CAGGCGAG
3911	UCCUGGCC CUGAUGAG X CGAA TUGUACAG		CTGTACAC A GGCAGGGA
3921	AGGUGCAG CUGAUGAG X CGAA IUCCUCGC		GCAGGACC C CTGCACCT
3922	CAGGUGCA CUGAUGAG X CGAA IGUCCUUG		CGAGGACC T GCACCTG
3923	CCAGGUGC CUGAUGAG X CGAA TGUCCUC		GAGGACCC T GCACCTGG
3926	CAUCCAG CUGAUGAG X CGAA ICAGGGUC		GAOCCTGC A CCTGGATG
3928	CCCAUCCA CUGAUGAG X CGAA IUGCAGGG		CCCTGCAC C TGGNTGGG
3929	CCCCAUCC CUGAUGAG X CGAA TUGCAGGG		CCTGCACC T GGATGGGG
3941	ACCCACAG CUGAUGAG X CGAA TACCCCA		TGGGGGTC C CTGTGGGT
3942	GACCCACA CUGAUGAG X CGAA IGACCCCC		GGGGGTCC C TGTGGGTC
3943	UGACCCAC CUGAUGAG X CGAA TGGACCCC		GGGGTCCC T GTGGGTCA
3951	CCCCAAU CUGAUGAG X CGAA TACCCACA		TGTGGTC A AATTGGGG
3968	ACUCCAC CUGAUGAG X CGAA TCACCUCC		GGAGGTGC T GTGGGAT
3984	AUAUAUC CUGAUGAG X CGAA TUAUUUA		TAAATATC T GAATATAT
4002	UUCAAAC CUGAUGAG X CGAA TAAAAACU		AGTTTTC A GTTTTGA

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II sequence and length (greater than or equal to 2 base-pairs)). I = Inosine nucleotide

Seq1 = TERT (Homo sapiens telomerase reverse transcriptase (TERT) mRNA, 4015 bp); Nakamura *et al.*, Science 277 (5328), 955-959 (1997)

Table 15

Table 15: Human telomerase reverse transcriptase (TERT) G-Cleaver Ribozyme and Target Sequence

nt. Position	Substrate Sequence	Seq ID Nos	Ribozyme Sequence	Seq ID Nos
16	GCUGGCUCCU G CUGGC		CGAG UGAUGGCAUGCAUAUGCGCG AGGAGCGAGC	
19	GCGUCCUGU G CGGAC		GUGCG UGAUGGCAUGCAUAUGCGCG AGGAGCGAGC	
21	GUCCUGUGG C CACGU		ACGUG UGAUGGCAUGCAUAUGCGCG GCAGCGAGC	
53	GGCACCCGC G CGAUG		CAGCG UGAUGGCAUGCAUAUGCGCG GCGGCGAGC	
55	CCAGCCCGC G AUGGC		GGCAU UGAUGGCAUGCAUAUGCGCG GCGGCGAGC	
58	CCCGCGGCU G CCGCG		CGCGG UGAUGGCAUGCAUAUGCGCG AUGCGGAGG	
61	CCGCGAGGC G CGCGC		GCGCG UGAUGGCAUGCAUAUGCGCG GGCAGCGCG	
63	GGAGUGCGC G CGCUC		GAGCG UGAUGGCAUGCAUAUGCGCG GCGGCAUCG	
65	CGCGUCCGC G CUGCC		GGGAG UGAUGGCAUGCAUAUGCGCG GCGCGGCAUC	
72	CGCGUCCGC G CUGCC		GGGAG UGAUGGCAUGCAUAUGCGCG GCGCGGCAUC	
75	GCUCGCCGU G CGGAG		GGGAG UGAUGGCAUGCAUAUGCGCG GCGCGGCAUC	
78	CCCGCGCGC G AGCGG		CUCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
85	GCAGAGCGU G CGCUC		CGGCU UGAUGGCAUGCAUAUGCGCG GCAGCGGAGC	
87	CGAGAGCGU G CUGCC		GAGCG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
94	UCCGCUCCU G CUGCG		GAGCG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
97	GCUCGCGU G CGGAG		CGGAG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
99	UCCGCGUCC G CAGCC		CUGCG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
111	AGCGCUAGC G CGAGG		GGCGU UGAUGGCAUGCAUAUGCGCG GCGGAGUGG	
113	CGAGUAGC G AGGUG		CAGCU UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
118	ACGCGAGGU G CUGCC		GGCGU UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
121	CGAGGUGGU G CGCGU		GGCGU UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
124	AGAGGUGGU G CUGGC		AGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
139	CCAGGUGGU G CGGCG		GGCGU UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
144	UUGGCGGCG C CUGG		CGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
172	GGCGGCGGU G CAGCG		CGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
177	CGGCGGCGG G CGGCG		CGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
198	CGGCGGCGG G CGGCG		CGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	
200	GGCGGCGG G CGGCG		CGCGG UGAUGGCAUGCAUAUGCGCG AGCGGCGAGC	

Table 15

202	CUUUCGCGC G CUGGU	ACAG UGAUGGCAUGCAUAUGCGG GCGCGAAG
216	GUUGCCAGU G CCUGG	CCAGG UGAUGGCAUGCAUAUGCGG ACUGGCGAC
223	AGUGCCAGU G UGUGU	ACGCA UGAUGGCAUGCAUAUGCGG ACCAGGCGU
225	UAGCUUGGU G CUGGC	GCAGG UGAUGGCAUGCAUAUGCGG ACACAGGCA
229	UGUUGUGU G CCUGG	CAGGG UGAUGGCAUGCAUAUGCGG AGCGACACCA
239	GCCUGGAGC G CAGGG	CCUUG UGAUGGCAUGCAUAUGCGG GUCCAGGGC
247	AGCAGCGGC G CCGCC	GGGGG UGAUGGCAUGCAUAUGCGG GCGCGUGCU
254	GCCGCCCCC G CCGCC	GGCGG UGAUGGCAUGCAUAUGCGG GCGGGGCGC
257	GCCCCCGGC G CCGCC	CCUGG UGAUGGCAUGCAUAUGCGG GGAAGGAGG
270	CCUCCUCC G CAGGG	CAGGA UGAUGGCAUGCAUAUGCGG ACUGGCGGA
277	UCCGCCAGGU G UCCUG	CAGGG UGAUGGCAUGCAUAUGCGG AGGACACUG
282	CAGGUGUCCU G CCUGA	UCCUU UGAUGGCAUGCAUAUGCGG AGCGAGACA
286	UGUCCUGCCU G AAGGA	GACUU UGAUGGCAUGCAUAUGCGG GGGCCACAG
303	CUUGGGGCC G AUGGC	UGCAG UGAUGGCAUGCAUAUGCGG ACUGGGGCA
307	UGGCCGAGU G CUCCA	CUUGG UGAUGGCAUGCAUAUGCGG AGCAUCUGG
310	CCCGAGUGCU G CAGAG	UCCGA UGAUGGCAUGCAUAUGCGG AGCUUGCA
319	UGCAGAGGU G CGAGA	GCUGG UGAUGGCAUGCAUAUGCGG ACAGCUCUG
321	CAGAGGCUU G CGAGC	GGCUU UGAUGGCAUGCAUAUGCGG GCAAGGCCU
323	GAGGCUUGGC G AGCGC	GGCGG UGAUGGCAUGCAUAUGCGG GCUAGCAG
327	CUUGCGAGC G CGGCG	CUUGG UGAUGGCAUGCAUAUGCGG GCGCGCUGG
332	CGAGCGCGC G GGAAG	UUCUU UGAUGGCAUGCAUAUGCGG GCGCGCGCU
334	AGCGCGCGC G AAGGA	GCAGG UGAUGGCAUGCAUAUGCGG AGCUUUGG
343	CGAGAGAGU G CUUGC	CAGCG UGAUGGCAUGCAUAUGCGG GAGCGGAG
359	CUUGGCUUC G CGCGU	AGCAG UGAUGGCAUGCAUAUGCGG GCGAAGCGA
361	UGGCGUCCG G CUUGU	UCCAG UGAUGGCAUGCAUAUGCGG AGCGGAGC
364	GCUCUGCGU G CUGGA	CCCGG UGAUGGCAUGCAUAUGCGG GGGCCCGUC
378	GACGGGCCC G CGGGG	GGCCU UGAUGGCAUGCAUAUGCGG GGGCGGGCC
392	GGGCCCCCCC G AGGCC	CUCCG UGAUGGCAUGCAUAUGCGG ACUCUGUGG
412	CCACGAGGU G CGGAG	AGCUG UGAUGGCAUGCAUAUGCGG GCACGUGGU
414	ACCAGGUGC G CAGCU	UUGGG UGAUGGCAUGCAUAUGCGG AGGUGGUGC
424	GCACUACUU G CCGAA	

Table 15

436	CCACAGCGU G ACCGA	UCCGU UGAUGGCAUGCAUAUGCGCG ACCUAGUUGG
440	CACGUGUACC G ACGCA	UCCGU UGAUGGCAUGCAUAUGCGCG GGUACCGGCG
443	GUUACCGAC G CACUG	CAGUG UGAUGGCAUGCAUAUGCGCG GUUGGUCACC
448	CCGACGACU G CGGGG	CCCGG UGAUGGCAUGCAUAUGCGCG AGUGGUGCGG
472	CGUGGGGCGU G CUGGU	AGCAG UGAUGGCAUGCAUAUGCGCG AGCCCCGACG
475	GGGGGCGUGU G CUGCG	CGCAG UGAUGGCAUGCAUAUGCGCG AGCCCCGACG
478	AGCGUGUGU G CGCGG	CGGCG UGAUGGCAUGCAUAUGCGCG AGCAGCAGCC
480	CUGUGUGUC G CGCGG	CGCGG UGAUGGCAUGCAUAUGCGCG GCGGACACAG
483	CUGUGUGGCC G CUGGG	CCACG UGAUGGCAUGCAUAUGCGCG GCCACACGCG
491	CCGCGUGGCC G ACGAC	GUCCU UGAUGGCAUGCAUAUGCGCG GUCCCCGACG
494	CGUGGCGGAC G ACGUG	CACGU UGAUGGCAUGCAUAUGCGCG ACCUGUGCG
499	GGGACGACU G CUGGG	ACGAG UGAUGGCAUGCAUAUGCGCG AGGUGACCA
511	UGGUGGACU G CUGGC	CCACG UGAUGGCAUGCAUAUGCGCG GUCCACGAG
519	CUGUGGACAC G CUGCG	CGCGG UGAUGGCAUGCAUAUGCGCG AGCGUGCGAG
522	CUGGACGCGU G CGCGC	GAGCG UGAUGGCAUGCAUAUGCGCG GCAGCGUGCC
524	GGGCGGCGC G CGCUC	AGAGG UGAUGGCAUGCAUAUGCGCG GCGCAGCGUG
526	CACGUGCGC G CUGUU	CAGCA UGAUGGCAUGCAUAUGCGCG AAAGAGCGCG
533	CGCGGUGUGU G CUGUG	ACGAG UGAUGGCAUGCAUAUGCGCG ACAGAGAGCG
535	CGGUGUGUGU G CUGGU	AGCGG UGAUGGCAUGCAUAUGCGCG AGCUUGGAGC
552	GUCCGACGUG G CGCCU	GUAGG UGAUGGCAUGCAUAUGCGCG GCAGCUGGGA
554	UCCGACGUG G CUGAC	CCGCA UGAUGGCAUGCAUAUGCGCG ACCUGUAGG
565	CCUACGAGGU G UGCGG	GGCGG UGAUGGCAUGCAUAUGCGCG ACACUGGUA
567	UACGAGGUGU G CGCGC	AGCGG UGAUGGCAUGCAUAUGCGCG GGCCCCGACA
574	UUGUGGAGCC G CCAGU	UACAG UGAUGGCAUGCAUAUGCGCG GAGCGGCGCG
577	GGGCGCGGCC G CUGUA	UGGUA UGAUGGCAUGCAUAUGCGCG AGCGGCGGCG
580	GGCGCGCGU G UACCA	GGCAG UGAUGGCAUGCAUAUGCGCG GCGGAGCUGG
593	CGAGGUGGCG G CUGCC	AGUGG UGAUGGCAUGCAUAUGCGCG AGCGCGGAGC
596	GCUGGCGGUG G CGACU	UGUGG UGAUGGCAUGCAUAUGCGCG GGCGGCGCGG
616	CCCGCGCGCC G CGACA	ACTAG UGAUGGCAUGCAUAUGCGCG GUUGGCGCGG
623	CCCGCGCAC G CUGAU	
636	AGUGGACCGC G AGGCG	GCCTU UGAUGGCAUGCAUAUGCGCG GGGGUCACU

Table 15

651	CGUCUGGAGU G CGAAC	GUUUG UGAUGGCAUGCAUAUGCGCG AUUCCAGACG
653	UCUUGGAUUC G AACG	CCGUU UGAUGGCAUGCAUAUGCGCG GCAUCCAGAG
703	CCUUGGCGU G CAGGC	GUUGU UGAUGGCAUGCAUAUGCGCG AGGCCGAGGG
716	AGUCCCGGUGU G CGAGG	CGUCG UGAUGGCAUGCAUAUGCGCG ACCCGGAGCU
718	CCC CGGUGUC G AGGAG	CUCCU UGAUGGCAUGCAUAUGCGCG GACCCGAGGG
726	CGGAGGAGGC G CGAGG	CCCGU UGAUGGCAUGCAUAUGCGCG GCUCCUUGGC
737	AGUCCGAGCC G AAGUC	GCUGG UGAUGGCAUGCAUAUGCGCG ACTUGCCCGCG
744	GCUGAGUGU G CGGUU	GACUU UGAUGGCAUGCAUAUGCGCG GCGUGGACU
751	GUUUGCGUUG G CCGAA	AACGG UGAUGGCAUGCAUAUGCGCG AGACUUUGGC
757	CAGGCGUGGC G CUGCC	UUUGG UGAUGGCAUGCAUAUGCGCG AACGGCAGAC
779	GCGUGGCGU G CCGCU	GGCAG UGAUGGCAUGCAUAUGCGCG GCCNCGCUG
782	CGUGGCGU G AGCGG	AGGGG UGAUGGCAUGCAUAUGCGCG AGCGCCAGCG
788	CGGCGCGGAC G CCGUU	CGGCU UGAUGGCAUGCAUAUGCGCG AGGGGCGAGG
802	CGGCGGAGAC G CCGUU	ACGGG UGAUGGCAUGCAUAUGCGCG GUCCGCUUGG
841	CGGCGGAGAC G CCGUU	CCAGG UGAUGGCAUGCAUAUGCGCG GUCCUGCGCG
850	CGGCGGAGAC G AGUGA	UCAGU UGAUGGCAUGCAUAUGCGCG GGUCCAGCGG
854	UGGACCGAGU G ACCGU	ACGGU UGAUGGCAUGCAUAUGCGCG ACTUGGTCGA
867	CGUGGUUUGU G UGUGG	CCACA UGAUGGCAUGCAUAUGCGCG AGAAACGAG
869	UGGUGUUGUGU G UGUGG	CACCA UGAUGGCAUGCAUAUGCGCG ACACAAACCA
874	UCUGUGUGUGU G UGACC	GGUGA UGAUGGCAUGCAUAUGCGCG ACCACACAGA
881	GGUGUACGU G CCGAA	UCUGG UGAUGGCAUGCAUAUGCGCG AGUGAGACCC
890	UGCCAGACCC G CCGAA	UUCGG UGAUGGCAUGCAUAUGCGCG GGUGUUGGCA
893	CAGACCCGUC G AAGAA	UUCUU UGAUGGCAUGCAUAUGCGCG GGCAGGUGUC
917	UUUGGAGGUGU G CGGUC	GAGCG UGAUGGCAUGCAUAUGCGCG ACCUCCGAAA
919	UGAGAGGUGUC G CUCUC	GAGAG UGAUGGCAUGCAUAUGCGCG GCACCCUCCA
931	UCUCUGGACG G CGCCA	UGCGG UGAUGGCAUGCAUAUGCGCG GUCCACAGAGA
933	UCUGGACAGC G CCAU	AGUGG UGAUGGCAUGCAUAUGCGCG GGUGGCGAGA
957	UCUCUGGAGCC G CCAAG	CGUGG UGAUGGCAUGCAUAUGCGCG GGCCGACGGA
968	CCAGCACACG G CGGCG	GCCTG UGAUGGCAUGCAUAUGCGCG GUUGGUGCGG
988	CAUCCACUAC G CGGCG	GGCCG UGAUGGCAUGCAUAUGCGCG GAUGUGGAUG
1012	CCUGGAGAC G CCTUG	CAAGG UGAUGGCAUGCAUAUGCGCG GUUGGCCAGG

Table 15

1017	GAACGCGU G UCCGC	GGGA UGAUGGCAUGCAUAUGCGG AGGCGUGUC
1027	GUCCCCCGU G UACGC	GCUA UGAUGCAUGCAUAUGCGG ACCGGGGAC
1031	CCCGGUAAC G CGAG	CUGG UGAUGCAUGCAUAUGCGG GUACACCGG
1034	GGUUAACG G AGAGC	GGUUC UGAUGCAUGCAUAUGCGG GCGUAACG
1064	CUUCUAGG G ACAA	CUUUG UGAUGCAUGCAUAUGCGG GCUUAGAGG
1078	AGAGCAGU G CGAGC	GGCGG UGAUGCAUGCAUAUGCGG AGCUUUCU
1105	UCAAGUCU G AGGCC	GGCUU UGAUGCAUGCAUAUGCGG AGAGAGUGA
1117	GGCCAGCU G ACUGG	CCAGU UGAUGCAUGCAUAUGCGG AGCUUGGCC
1124	CGUACUGG G CUGGG	CGAG UGAUGCAUGCAUAUGCGG GCGAGUCAG
1171	GGCCUGGAG G CCGAG	CCUGG UGAUGCAUGCAUAUGCGG AUCCAGGCC
1185	GGGACUCC G CAGGU	ACUUG UGAUGCAUGCAUAUGCGG GGGGAGUCC
1192	CCGCGAGU G CCGCG	CGGGG UGAUGCAUGCAUAUGCGG AACUUGGCC
1197	AGGUGGCCC G CUGGC	GCAGG UGAUGCAUGCAUAUGCGG GGGGCAACU
1201	UGCCCCGCU G CCGCA	UGGGG UGAUGCAUGCAUAUGCGG AGCGGGAGCA
1209	CUGCCGAG G CUACU	AGUAG UGAUGCAUGCAUAUGCGG GCUUGGGAG
1222	ACUGGCAAU G CGGCC	GGCGG UGAUGCAUGCAUAUGCGG AUUUGCCAU
1231	UGCGCGCCU G UUUU	AGAAA UGAUGCAUGCAUAUGCGG AGGCGCGCA
1243	UUUGGAGU G CUUGG	CCAGG UGAUGCAUGCAUAUGCGG GUGGUUCCA
1256	UGGGAACAC G CGGAG	CUUGG UGAUGCAUGCAUAUGCGG GCUUGGUUCC
1258	GGACGACGC G CAGUG	AGGGG UGAUGCAUGCAUAUGCGG ACUGCGGCG
1263	CAGCGGAGU G CCGCU	AGGAG UGAUGCAUGCAUAUGCGG ACCCGUAGG
1276	CCUACGGGU G CUUCU	CAGUG UGAUGCAUGCAUAUGCGG GUUCUAGGA
1288	UCCUCAAG G CAGUG	GGCGG UGAUGCAUGCAUAUGCGG AGUGGCUU
1293	AGACGACU G CCGGC	CGCAG UGAUGCAUGCAUAUGCGG GGGCAUGCG
1297	GGCACUGCC G CUGCG	GUUGG UGAUGCAUGCAUAUGCGG AGCGGGCAU
1300	ACUGGCCGU G CGAGC	CAGCU UGAUGCAUGCAUAUGCGG GCGCGGGCA
1302	UGCCCGUUC G AGCUG	GAGCG UGAUGCAUGCAUAUGCGG AGCUCCGAC
1307	CGUGCGAGU G CCGGC	ACAGA UGAUGCAUGCAUAUGCGG ACCGGUUCU
1328	AGCAGCGGU G UCUUG	GGCCA UGAUGCAUGCAUAUGCGG AGACCGCG
1332	GGCGGUGU G UGCCC	CCGGG UGAUGCAUGCAUAUGCGG ACAGACCGG
1334	CGUUGUGU G CCGGG	

Table 15

1358	CCAGGCGUCU G UGGCG	CGCCA UGAUGGCAUGGCAUAUGCGG AGAGCCUUG
1370	GGCGGCCCC G AGGAG	CUCCU UGAUGGCAUGGCAUAUGCGG GGGGGCCGC
1395	GAACCCCGGUC G CUGG	CCAGG UGAUGGCAUGGCAUAUGCGG GACGGGGUIC
1402	GUCCGUCUGU G CAGCU	AGCUG UGAUGGCAUGGCAUAUGCGG ACCAGCGMAC
1408	UGGUGAGCU G CUCCG	CGGAG UGAUGGCAUGGCAUAUGCGG ABCUGACCCA
1413	CAGUCUUCG G CGAGC	GCUGG UGAUGGCAUGGCAUAUGCGG GAGGACAGCU
1438	CCUGGCAGU G UACGG	CCGUA UGAUGGCAUGGCAUAUGCGG ACCUGCCAGG
1450	ACGGCUUGU G CGGAC	GCCCG UGAUGGCAUGGCAUAUGCGG ACGAAGCGU
1458	GGCGGGGCU G CCUCC	GCAGG UGAUGGCAUGGCAUAUGCGG AGGCCCGCAC
1462	GGGCCUGCCU G CGCCG	CGCGG UGAUGGCAUGGCAUAUGCGG AGGCGAGGCC
1464	GCUCGCGUG G CGGGC	GCCTG UGAUGGCAUGGCAUAUGCGG ACCAGCGGCG
1474	GCUGGCUUGU G CCCCC	GGGGG UGAUGGCAUGGCAUAUGCGG GAGGCGAGGC
1505	CAGGCACAC G AACGC	GCCHU UGAUGGCAUGGCAUAUGCGG GUUGUGCCUG
1509	CACACGAC G CCGCU	AGCCG UGAUGGCAUGGCAUAUGCGG GUUCCGUGG
1512	AACGACGCC G CUUCC	GGAGG UGAUGGCAUGGCAUAUGCGG GCGCUUGGU
1556	GGGGAGCAU G CCAAG	CUUGG UGAUGGCAUGGCAUAUGCGG AUGCUUCCGC
1567	CCAGCUCUC G CUGCA	UGCAG UGAUGGCAUGGCAUAUGCGG GAGAGCUUGG
1570	AGCUCUGCU G CAGGA	UCCUG UGAUGGCAUGGCAUAUGCGG AGCGAGAGCU
1579	UGCAGGAGCU G ACGUG	CACGU UGAUGGCAUGGCAUAUGCGG AGCUCUGCA
1591	CGGAGGAGU G AGCUU	ACGCU UGAUGGCAUGGCAUAUGCGG AUCCUCCAG
1597	AGAGAGCCU G CGGGA	UCCCG UGAUGGCAUGGCAUAUGCGG ACGCUCAUU
1605	GUGCGGGACT G CGCUU	AAGCG UGAUGGCAUGGCAUAUGCGG ABUCGCGAC
1607	GGCGGACUGC G CUUGG	CCAAG UGAUGGCAUGGCAUAUGCGG GCABUCCGCG
1615	GGCCUGAGCU G CGCAG	CUUGG UGAUGGCAUGGCAUAUGCGG AGCCAGGCG
1617	GCUGGGCUGC G CAGGA	UCCUG UGAUGGCAUGGCAUAUGCGG GCAGCGAGC
1638	GGAGUUGCU G UGUUC	GAACA UGAUGGCAUGGCAUAUGCGG AGCCACCCG
1640	GGUUGGCUU G UUGCG	CGGAA UGAUGGCAUGGCAUAUGCGG ACAGCCACCC
1649	UGUUCGCGGC G CAGAG	CUUGG UGAUGGCAUGGCAUAUGCGG GGCCGGAACA
1663	AGCACCGUCU G CGUGA	UCAGG UGAUGGCAUGGCAUAUGCGG AGAGGUGCU
1667	CCUCUGGCU G AGGAG	CUCCU UGAUGGCAUGGCAUAUGCGG ACGCAGCGG
1690	CCAGGCUCCU G CACUG	CAGUG UGAUGGCAUGGCAUAUGCGG AGGACUUGG

Table 15

1699	UGCAGUGGU G AUGAG	GUCAU UGAUGGCAUGCAUAUGCGG AGCCAGUGCA
1702	ACUGGCUAAU G AGUGU	ACACU UGAUGGCAUGCAUAUGCGG AUCAGCGAGU
1706	GUCAUGAGU G UUAAC	GUACA UGAUGGCAUGCAUAUGCGG ACUCUAUGC
1708	UGAUGAGU G UACAU	ACGUA UGAUGGCAUGCAUAUGCGG ACACUUAUA
1718	GUACUGUC G AGCUG	CAGCU UGAUGGCAUGCAUAUGCGG GACGACUAC
1723	UGUGAGGU G CUGAG	CUGAG UGAUGGCAUGCAUAUGCGG AGCUGAGCA
1742	UUUCUUUAU G UCAAG	CUUUA UGAUGGCAUGCAUAUGCGG AUAAAGAAA
1793	CGAGAGU G UCUGG	CGAGA UGAUGGCAUGCAUAUGCGG ACUCUGCGG
1807	GAGGAGGU G CAAAG	CUUUG UGAUGGCAUGCAUAUGCGG AAGUCUUC
1834	GACAGACU G AAGAG	CUCUU UGAUGGCAUGCAUAUGCGG ACCUCUUA
1843	UGAGAGGU G CAGCU	UCCCG UGAUGGCAUGCAUAUGCGG AGCTCCGCA
1849	GAGUGGAGU G UCGGA	UCCGA UGAUGGCAUGCAUAUGCGG AGCTCCGCA
1858	UGCGGAGU G UCGGA	UCCCG UGAUGGCAUGCAUAUGCGG AGCTCCGCA
1898	AGCGAGGCG G CCGUG	CAGGG UGAUGGCAUGCAUAUGCGG GAGCUGGU
1903	CGCGCGCGU G CUGAG	GUACG UGAUGGCAUGCAUAUGCGG AGCGCGGCG
1906	CGCGCGCGU G ACUGC	GUACG UGAUGGCAUGCAUAUGCGG AGCGCGGCG
1920	UCCAGACUG G CUUUA	GUACG UGAUGGCAUGCAUAUGCGG AGCGCGGCG
1937	CCCGAGCGU G ACAGG	UGNAG UGAUGGCAUGCAUAUGCGG GAGUCUGGA
1945	CUAGCGCGU G CGGCC	CCCGU UGAUGGCAUGCAUAUGCGG AGCGCGGCG
1951	GCGUGCGCG G AUUGU	CCCGU UGAUGGCAUGCAUAUGCGG AGCGCGGCG
1955	CGCGCGGAGU G UGAAC	ACAAU UGAUGGCAUGCAUAUGCGG GCGCGAGCG
1957	GCGCGGAGU G AUAUA	GUUUA UGAUGGCAUGCAUAUGCGG AAGCGCGCG
1992	AGAGCGUCC G CAGAG	AUGUU UGAUGGCAUGCAUAUGCGG ACAGUGGCG
2009	AAGAGGCG G AGCGU	CUCUG UGAUGGCAUGCAUAUGCGG GGAAGCUU
2023	GUUUAACUG G AGGUA	ACCGU UGAUGGCAUGCAUAUGCGG GCGCGCGCG
2029	CCUGAGAGU G AAGCG	ACCGU UGAUGGCAUGCAUAUGCGG GAGUGAGAG
2038	UGAGGCGAU G UUCAG	GCGUU UGAUGGCAUGCAUAUGCGG AGCGCGGCG
2047	UGUCCAGGU G CUUUA	CUUUA UGAUGGCAUGCAUAUGCGG AGCGCGGCG
2057	GCUCACUAC G AGCGG	UUGAG UGAUGGCAUGCAUAUGCGG AGCGCGGCG
2065	ACGAGCGCG G CGCGG	CGCGU UGAUGGCAUGCAUAUGCGG GCGCGCGCG
2070	CGCGCGCGG G CGCGG	CGCGG UGAUGGCAUGCAUAUGCGG GCGCGCGCG

Table 15

2087	CCUCCUGGAC G CCUCU	AGAGG UGAUGGCAUGCAUAUGCGCG GCCCAAGAGG
2093	GAGGCGCUCU G UGUCUG	CAGCA UGAUGGCAUGCAUAUGCGCG AAGGCGCCGC
2095	GCGCCUCUCU G CUGGG	CCGAG UGAUGGCAUGCAUAUGCGCG ACAAGGCGCC
2108	GCGCCUGGAC G AUAUC	GAUAA UGAUGGCAUGCAUAUGCGCG GUCCAGCGCC
2127	AGGCGCCGAC G CACCU	AGGUG UGAUGGCAUGCAUAUGCGCG GCCAGGCTCU
2137	GCAUCUCGU G CUGCG	CGCAG UGAUGGCAUGCAUAUGCGCG ACCAAGGUGU
2140	CCUGGUCGU G CGUGU	AACAG UGAUGGCAUGCAUAUGCGCG AGCGAGCAGG
2144	CGUGACUCGU G UGCGG	AGCGA UGAUGGCAUGCAUAUGCGCG AGCGAGCAGG
2146	UCCAGGACCU G CGAGC	GCCCG UGAUGGCAUGCAUAUGCGCG GAGUCUUGAG
2161	CCAGGAGCC G CCGCC	GCGCG UGAUGGCAUGCAUAUGCGCG GAGUCUUGAG
2164	AGGACCGGCC G CCUGA	UCAGG UGAUGGCAUGCAUAUGCGCG GAGUCUUGAG
2168	CCGCGCCGCU G AGCUA	CAGCU UGAUGGCAUGCAUAUGCGCG AGCGCGCGGG
2173	GCGUGAGCU G UCAAG	AAGUA UGAUGGCAUGCAUAUGCGCG AGTUCAGGCG
2180	GCUGUACUU G UGACG	CUUAA UGAUGGCAUGCAUAUGCGCG AAGUCAGGCG
2192	CAGGUGGAGU G UGACG	CGUCA UGAUGGCAUGCAUAUGCGCG AUCCACUUG
2194	AGUGGAGUU G ACGGG	CCCGU UGAUGGCAUGCAUAUGCGCG ACUCCACCU
2201	UGUGAGGGCC G CGUAC	GUAGG UGAUGGCAUGCAUAUGCGCG GCCGUGCAGA
2207	GCGCGGCUAC G ACACG	GUUUG UGAUGGCAUGCAUAUGCGCG GUAGCGCGCC
2243	GGAUGGUAUC G CCAAC	GCUGG UGAUGGCAUGCAUAUGCGCG GAUAGCUCUC
2274	AACACUUAU G CGUCC	GCAGG UGAUGGCAUGCAUAUGCGCG AGUAGGUGUU
2278	CGUACUGGU G CGUCC	CGAGG UGAUGGCAUGCAUAUGCGCG AGCGAGUAG
2288	GCGUGGUAU G CCGUG	CACGG UGAUGGCAUGCAUAUGCGCG AUACCGAGCG
2306	CCAGAGGCC G CCGAU	AGGCG UGAUGGCAUGCAUAUGCGCG GCGCUCUGGG
2322	GCGCAGUCC G CAAGG	CCUUG UGAUGGCAUGCAUAUGCGCG GCGCUCUGGG
2353	UCUUAACUU G ACAGA	UCUUG UGAUGGCAUGCAUAUGCGCG GCGCUCUGGG
2374	AGCGGUAU G CGACA	UCUUG UGAUGGCAUGCAUAUGCGCG GCGCUCUGGG
2376	CGGUACUUG G ACAGU	UCCUG UGAUGGCAUGCAUAUGCGCG AGGCGAGCA
2395	UGGUCACUU G CAGA	CUUAG UGAUGGCAUGCAUAUGCGCG GCGCUCUGGG
2410	AGACCAAGCC G CUGAG	UCCUG UGAUGGCAUGCAUAUGCGCG AGGCGAGCA
2413	CGAGCCGCU G AGGGA	GACGG UGAUGGCAUGCAUAUGCGCG AUCCUCAGC
2420	GCUAGGGAGU G CCGUC	

Table 15

2432	CGUGUACU G AGCAG	CUUCU UGAUGGCAUGCAUAUGCGG GAUGAGCAGG
2449	GUUCUCCU G AAGA	UUAU UGAUGGCAUGCAUAUGCGG AGGAGGAGC
2453	CUUCUUAU G AGGCC	GUCCU UGAUGGCAUGCAUAUGCGG AUUCGGAG
2474	UGGCCUUCU G AGGUC	GACGU UGAUGGCAUGCAUAUGCGG GMAGAGCCA
2487	GUUCUUAU G CUUCA	UUAU UGAUGGCAUGCAUAUGCGG GUAGAGAAC
2494	UAGCCUUAU G UGCCA	UGCCA UGAUGGCAUGCAUAUGCGG AUGAAGGUA
2496	CGUCCUAU G CCACC	GUUGG UGAUGGCAUGCAUAUGCGG ACAUAGAGG
2504	GUCCACCA G CCGUG	CACGG UGAUGGCAUGCAUAUGCGG GUGUGGCAC
2509	ACGAGCCGU G CGCAU	AUUGG UGAUGGCAUGCAUAUGCGG AGCGGUGGU
2511	CAGCCGUGG G CAUCA	UGAUG UGAUGGCAUGCAUAUGCGG GCACGCGUG
2538	UAGUCCAGU G CCAGG	CCUGG UGAUGGCAUGCAUAUGCGG ACUGGACUA
2551	AGGAGUCC G CAGGG	CCUGG UGAUGGCAUGCAUAUGCGG GCGAUCCCU
2572	UCUCCUCC G CUCCU	AGCAG UGAUGGCAUGCAUAUGCGG GUAGAGAGA
2575	UCUCCUCCU G CUUG	CAGAG UGAUGGCAUGCAUAUGCGG AGCGUGAGA
2580	ACGUGUCCU G CAGCC	GGCUG UGAUGGCAUGCAUAUGCGG AGAGCAGGA
2587	UCUGCAGCU G UGCUA	UAGCA UGAUGGCAUGCAUAUGCGG AGCGUGAGA
2589	UGGACCCGU G CUACG	CUUAG UGAUGGCAUGCAUAUGCGG ACAGCUGCA
2597	GUCCUAGG G ACNUG	CAUGU UGAUGGCAUGCAUAUGCGG GCGUAGCAC
2614	AGACUAGU G UUGUC	GCMAA UGAUGGCAUGCAUAUGCGG AGCUUUCU
2618	CAAGCUUAU G CGGGG	CCCCG UGAUGGCAUGCAUAUGCGG AACACGUGG
2641	GUGAGGCU G CUCCU	AGGAG UGAUGGCAUGCAUAUGCGG AGCCGUGCC
2647	GGCUGUCCU G CUUHU	AAAGG UGAUGGCAUGCAUAUGCGG AGGAGCAGC
2660	UUGUGGUAU G AUUUC	GAAAU UGAUGGCAUGCAUAUGCGG AUCCACAAA
2668	AUGAUUCCU G UUGGU	ACCAA UGAUGGCAUGCAUAUGCGG AAGAAUAU
2674	UCUGUGUHU G ACACC	GUUGU UGAUGGCAUGCAUAUGCGG ACCAACAGA
2693	CCUACCCAC G CGAAA	UUUGG UGAUGGCAUGCAUAUGCGG GUUGGAGG
2695	UACCCACG G AAAAC	GUUUU UGAUGGCAUGCAUAUGCGG GCGGGGUGA
2721	ACCUUGUCC G AGUGG	CACCU UGAUGGCAUGCAUAUGCGG GGCACAGGU
2726	GUUCCAGGU G UCCCU	AGGGA UGAUGGCAUGCAUAUGCGG ACCUGGACC
2732	AGUUGUCCU G AGUAU	AUAUU UGAUGGCAUGCAUAUGCGG AGGAGACAU
2742	GAUAUGGU G CUUGG	CCACG UGAUGGCAUGCAUAUGCGG AGCCUAUCU

Table 15

2749	GTCTGGGUGU G AACUU	AAUUU UGAUGGCAUGCAUAUGCGG ACCAGGAGC
2755	UGUGUAACUU G CGGAA	UUCCG UGAUGGCAUGCAUAUGCGG AAGUJONCA
2770	AGACAUUGGU G ACUUU	AAUUU UGAUGGCAUGCAUAUGCGG ACCACUUGU
2780	GRACUUCUU G UGAAA	UUUUU UGAUGGCAUGCAUAUGCGG AGGAGAGUUC
2789	UGUAGAAGC G AGGCC	GGCCU UGAUGGCAUGCAUAUGCGG GUUUUUUACA
2813	CAGGCUUUU G UUCAG	CUGAA UGAUGGCAUGCAUAUGCGG AAAGCGGUG
2821	UUUUCUAGU G CGGCG	GGCCG UGAUGGCAUGCAUAUGCGG AUUCAGCAA
2847	UUCCCUUGU G CGGCG	GGCCG UGAUGGCAUGCAUAUGCGG ACCAGGGGAA
2854	GGUGGCGCU G CUGCU	AGCAG UGAUGGCAUGCAUAUGCGG AGCGCGAGC
2857	GGGCGUUGU G CUUGA	UUCAG UGAUGGCAUGCAUAUGCGG AGCAGGCCG
2881	CCUUGAGGU G CAGAG	CUUUG UGAUGGCAUGCAUAUGCGG ACCUCCAGG
2888	GGUGCAGGC G ACUAC	GUAGU UGAUGGCAUGCAUAUGCGG GCUUGGAGC
2903	CUCCAGCUU G CCGCG	CGGCG UGAUGGCAUGCAUAUGCGG AUAGCUGAG
2940	ACUUCACGC G CGGCU	AGCCG UGAUGGCAUGCAUAUGCGG GGUUGAGGU
2965	GGAGGACAU G CGUUG	CGAGG UGAUGGCAUGCAUAUGCGG AUGUUCUCC
2970	AACAUUGGUC G CAAAC	GUUUU UGAUGGCAUGCAUAUGCGG GAGCAGUUU
2989	UUUGGAGUUU G CGGCU	AGCCG UGAUGGCAUGCAUAUGCGG AAGACCCGAA
2995	UUTUGGCGU G AAGUG	CACUU UGAUGGCAUGCAUAUGCGG AGCCGCAAG
3000	CGGCGAGU G UCNCA	UUUGA UGAUGGCAUGCAUAUGCGG ACUUCGCGG
3010	GUCAACGCU G UUUUU	AGAAA UGAUGGCAUGCAUAUGCGG AGGCUUGAC
3028	UUCUGGAAUU G CAGUU	ACCUU UGAUGGCAUGCAUAUGCGG AAUCCAGAA
3046	AUUGGAGGU G AAGAG	CUGUU UGAUGGCAUGCAUAUGCGG ACCUCCAAU
3073	UCCUCCUUGU G CAGGC	GUUGA UGAUGGCAUGCAUAUGCGG ACCGCUUGA
3076	UCCAGAGCGU G UGCAC	UUUGG UGAUGGCAUGCAUAUGCGG AGGAGGAGU
3088	CAGACGUAUU G CACCA	UUCAG UGAUGGCAUGCAUAUGCGG AGGAGGAGU
3095	UCCUCCUUGU G CAGGC	GGCUU UGAUGGCAUGCAUAUGCGG AGCAGAGGA
3099	UUCACGGAU G UGUUC	ACAUU UGAUGGCAUGCAUAUGCGG GUAGAAACCU
3101	UCCAGAGCGU G UGCUG	GGACA UGAUGGCAUGCAUAUGCGG AUUCGUGAAA
3103	AGCAUUGU G CUUGA	CAGCA UGAUGGCAUGCAUAUGCGG ACAUGGUGUA
3106	CAUGGUGUUGU G CAGCU	UUCAG UGAUGGCAUGCAUAUGCGG AGCAUUGCU

Table 15

3154	CAUUAUUUUU G C CUGU	ACGCG UGAUGGCAUGCAUAUGCGCG AGGAAAUAUG
3156	UUUAUUUUUU G CUGUA	UGACG UGAUGGCAUGCAUAUGCGCG GCAGGAAAA
3167	GUUAUUUUU G ACUAG	CGUUU UGAUGGCAUGCAUAUGCGCG AGAGAUAGCG
3183	GUUUUUUUU G CUAUG	AGUAG UGAUGGCAUGCAUAUAUGCGCG AGAGGAGCG
3196	ACUCCAUUUU G AAAGC	GCUUU UGAUGGCAUGCAUAUGCGCG AGGAUAGGAU
3209	AGCCAAAGAC G CAGGG	CCUUU UGAUGGCAUGCAUAUGCGCG GUUUUUUUU
3217	ACGCAGAGAU G UCCUU	AGCGA UGAUGGCAUGCAUAUGCGCG AUCCUUGCGU
3220	CAGGAUAUUC G CUGGG	CCACG UGAUGGCAUGCAUAUGCGCG GACAUUCCUG
3236	GGCCAAAGGC G CCGGC	GGCGG UGAUGGCAUGCAUAUGCGCG GCCUUUUGCG
3239	CAUAGGCGCC G CCGGC	GGCGG UGAUGGCAUGCAUAUGCGCG GCGGCGCUUG
3250	CCGCGCCUUU G CCGUC	GAGGG UGAUGGCAUGCAUAUGCGCG GGAAGUACAG
3257	UUUGCCCUCC G AAGGC	GGCCU UGAUGGCAUGCAUAUGCGCG ACGGCCUUUG
3265	CCGAGGCGUU G CAGUG	CACUG UGAUGGCAUGCAUAUGCGCG ACGGCCUUUG
3274	UACAGUAGUU G UGCCA	UGGCA UGAUGGCAUGCAUAUGCGCG AGCCACUUGA
3276	CAGUGGCUUU G CACGC	GGUGG UGAUGGCAUGCAUAUGCGCG ACAGCCACUG
3292	AAGCAUUUUU G CUAAA	UGAGG UGAUGGCAUGCAUAUGCGCG AGGAAUGUUU
3301	UGCUUAAAGU G ACUGG	CGAGU UGAUGGCAUGCAUAUGCGCG AGCUUAGCA
3306	AAGCUAGACU G ACACC	GGUUG UGAUGGCAUGCAUAUGCGCG GAGUACGCUU
3314	UCCACACCGU G UCAAC	GGUGA UGAUGGCAUGCAUAUGCGCG ACCGUUUGCA
3325	UCCACUACUU G CCACU	AGUGG UGAUGGCAUGCAUAUGCGCG ACGUAGGUGA
3358	CAGCCCAAGC G CAGCU	AGCUG UGAUGGCAUGCAUAUGCGCG GUUUUGGCGU
3364	AGAAGCAAGU G AGUUG	CCACU UGAUGGCAUGCAUAUGCGCG AGCUUGCUU
3385	UCCCGAGGAC G ACCGU	AGCUG UGAUGGCAUGCAUAUGCGCG GUCCCCGGGA
3388	CGGGAACGAC G CUUAC	GUUAG UGAUGGCAUGCAUAUGCGCG GUUUCUCCUG
3391	GGACACCGUU G ACUGC	CGAGU UGAUGGCAUGCAUAUGCGCG AGCUUGUCC
3395	GAGCCUAGAU G CCUGG	CAGGG UGAUGGCAUGCAUAUGCGCG AGUACAGCUC
3407	CCUUGAGGCC G CAGCC	GGCUG UGAUGGCAUGCAUAUGCGCG GGCUCUAGUG
3424	ACCCGCAAGU G CCGUC	GAGGG UGAUGGCAUGCAUAUGCGCG AGUGCCGGBU
3453	AUCUUGAGAU G UCCGC	GCUAU UGAUGGCAUGCAUAUGCGCG AGUCACAGAU
3464	AUGGCAACCC G CCGAC	GUUAG UGAUGGCAUGCAUAUGCGCG GGGUUGCCAU
3479	CAGCCAGGCC G AGAGC	GCUCU UGAUGGCAUGCAUAUGCGCG GBCUUGGCGU

Table 15

3501	CAGCAGCCU G UCAGG	CGUGA UGAUGGCAUGCAUAUGCGG AGGCGUGUA		
3506	GGCCUGAC G CGGG	CCGG UGAUGGCAUGCAUAUGCGG GUGACAGGC		
3554	ACCAGGCC G CAGCG	CGAUG UGAUGGCAUGCAUAUGCGG GGGCGGGU		
3559	GGCCCGACC G CUGGG	CCGAG UGAUGGCAUGCAUAUGCGG GUGCGGGC		
3570	CUGGAGUCU G AGGCC	GGCCU UGAUGGCAUGCAUAUGCGG AGACUCCAG		
3577	UUUGAGCCU G AUGUA	UACU UGAUGGCAUGCAUAUGCGG AGGCCUAGA		
3581	AGGCCUGAGU G AGUGA	ACACU UGAUGGCAUGCAUAUGCGG ACUCAGACU		
3585	CUGAGAGU G UUGGG	CCAAA UGAUGGCAUGCAUAUGCGG ACUCACACG		
3593	GUUUGGCC G AGGCC	GGCCU UGAUGGCAUGCAUAUGCGG GGCACAAAC		
3600	GGCAGGCCU G CAUGU	ACAUU UGAUGGCAUGCAUAUGCGG AUGCAGGCCU		
3604	AGCCUGACU G UCCGG	CCGGA UGAUGGCAUGCAUAUGCGG AGGCCGACU		
3612	AUUCGAGCU G AAAGC	ACACU UGAUGGCAUGCAUAUGCGG AGCCUACAG		
3619	GCUGAGGCCU G AGUGU	CCGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3623	AAAGCUGAGU G UCCGG	GGCCU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3631	GUUCCAGCU G AGGCC	GGCCU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3638	CCUGAGGCCU G AGCGA	ACACU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3642	AGCCUGAGC G AGUGU	CGGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3646	CUGAGCAGU G UCCAG	UCCCU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3661	GCCAGAGCCU G AGUGU	ACACU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3665	AGGCGUGAGU G UCCAG	CUGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3678	CAGCAGCCU G CCUGC	GGCCU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3705	ACAGCGCCU G CCUGC	CUGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3789	CCCAGAGU G CCAGU	CGGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3795	AUUCGCAU G UUCAC	CGGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3806	UUCACCCU G CCUGC	AAUGG UGAUGGCAUGCAUAUGCGG AGCCGACU		
3811	CCUCGCCCU G CCUGC	GUUUA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3821	GGCCUGCUU G CCUGC	GAAGG UGAUGGCAUGCAUAUGCGG AGCCGACU		
3854	UGGAGGCCU G AGAAG	CUUUC UGAUGGCAUGCAUAUGCGG AGCCGACU		
3888	AUUUGAGU G ACCAA	UUUGU UGAUGGCAUGCAUAUGCGG AGCCGACU		
3898	GACCAAGU G UGCCG	GGGGA UGAUGGCAUGCAUAUGCGG AGCCGACU		
3900	CCAGAGU G CCUGC	CAGGG UGAUGGCAUGCAUAUGCGG AGCCGACU		

Table 15

3905	GUUGUGCCU G UACAC	GUUA UGAUGGCAUGCAUAUGCGG AGGGACACC
3915	GUACACAGGC G AGGAC	GUCCU UGAUGGCAUGCAUAUGCGG GCCUGUGUAC
3924	CGAGGACCCU G CACCU	AGGUG UGAUGGCAUGCAUAUGCGG AGGGUCCUG
3944	GGGGUCCCU G UGGGU	ACCCA UGAUGGCAUGCAUAUGCGG AGGGACCCG
3966	GGGGGAGGU G CUGUG	CACAG UGAUGGCAUGCAUAUGCGG ACCUCCGCCG
3989	GGGAGGUGCU G UGGGA	UCCCA UGAUGGCAUGCAUAUGCGG AGCACUCCG
3985	GUAAAUACU G AAUAU	AUAUU UGAUGGCAUGCAUAUGCGG AGUAUUUAC
3993	CUAAUAUAI G AGUUU	AAACU UGAUGGCAUGCAUAUGCGG AUUAUUUAC
4008	UUUCAGUUUU G AAAAA	UUUUU UGAUGGCAUGCAUAUGCGG AAAAAUGAAA

Seq1 = TERT (Homo sapiens telomerase reverse transcriptase (TERT) mRNA, 4015 bp); Nakamura *et al.*, Science 277 (5328), 955-959 (1997)

Input Sequence = TERT. Cut Site = YGIM or UGU.

Stem Length = 5/10. Core Sequence = UGAUG GCAUGCAUAUGC GGC

Table 16

Table 16: Human telomerase reverse transcriptase (TERT) DNazyme and Target Sequence

nt. Position	DNazyme Sequence	Seq. ID Nos	Substrate	Seq. ID Nos
9	CAGGAGCG GGGTAGCTACAAAGG AGCGCTGC		GCAGCGCT G GCGTCTCTG	
11	AGGAGGAC GGGTAGCTACAAAGG AGCGCTGC		AGCGCTGC G GTCCTGCT	
16	TGCGGAGC GGGTAGCTACAAAGG AGGAGGAC		TGGCTGCT G GCTGCGGA	
19	ACGTGCGC GGGTAGCTACAAAGG AGGAGGAC		GTCTGCTT G GCGCACTT	
21	CCAGTGC GGGTAGCTACAAAGG GCGAGAG		CTGTGTC G GCGAGTGG	
23	TCCCAAGT GGGTAGCTACAAAGG GCGAGAG		TGCTGCGC A AGTGGGGA	
25	CTCCGAC GGGTAGCTACAAAGG GTGGCAG		CTGCGCAC G GTGGGAGG	
32	GCGAGGCG GGGTAGCTACAAAGG TTCCGAG		COTGGGAA G GCGCTGCG	
38	GCGGCGCG GGGTAGCTACAAAGG CAGGGCTT		AAAGCTCTG G GCGCGGCG	
44	GAGGTGCG GGGTAGCTACAAAGG CGGGGCGA		TGGCTCGG G GCGACCGC	
47	GCGGGGGT GGGTAGCTACAAAGG GCGCGGCG		CCCGGCGC A AGCGCGCG	
53	GCGATCGC GGGTAGCTACAAAGG GCGGGTGG		CCACCGCC G GCGATGCG	
56	GCGGCGAT GGGTAGCTACAAAGG GCGGGTGG		CCCGCGCG A ATGCGCGG	
58	CGCGCGCG GGGTAGCTACAAAGG ATCGGGGG		CCCGGCGT G GCGCGCGG	
61	GAGCGCGC GGGTAGCTACAAAGG GCGATCGC		GCATGTC G GCGCGCTC	
63	GCGAGCGC GGGTAGCTACAAAGG GCGGCGATC		GAATGCGC G GCGCTCGC	
65	CGGGGAGC GGGTAGCTACAAAGG GCGCGGCG		TGCGCGCG G GCTCGCGG	
72	TGCGGAGC GGGTAGCTACAAAGG GGGGAGCG		GCTTCGCG G GCTGCGGA	
75	GCGTCGCG GGGTAGCTACAAAGG AGCGGGGA		TGCGCGCT G GCGGAGCG	
80	CGGAGCGC GGGTAGCTACAAAGG TCGGCGCG		GCTGCGGA G GCGGTGCG	
83	GAGCGGAC GGGTAGCTACAAAGG GCGTGC		GCGGAGCG G GTCGCTTC	
85	GCGGAGCG GGGTAGCTACAAAGG AGCGCTCG		CGAGCGGT G GCGCTCGC	
87	CAGGGAGC GGGTAGCTACAAAGG GCGGCGCT		AGCGGTGC G GCTCGCTG	
94	TGCGGAGC GGGTAGCTACAAAGG AGGGGCG		GCTTCGCT G GCTGCGGA	
97	GCGTGC		TGCGTGC G GCGGAGCG	
99	GTGGCTGC GGGTAGCTACAAAGG GCGGAGCG		CTGCTGCG G GCGGAGCG	
102	GTAGTGGC GGGTAGCTACAAAGG TGGGAGCG		GCTGGCGA G GCGGAGCG	

Table 16

105	GGGTAGT GGTAGTACACGA GGTGCGC	GGCAGCC A ACTACCC
106	CTCCGGT GGTAGTACACGA AGTGCTG	CAGCACT A ACCCGAG
111	CACCTGC GGTAGTACACGA GTTAGTGT	GCATACC G GCGAGTG
116	GACGANC GGTAGTACACGA CTCGGGT	AACCGAG G GTGCTGC
118	GGGAGC GGTAGTACACGA ACCTGGG	CGCGAGT G GTGCGCC
121	CACGGGC GGTAGTACACGA AGCAGTC	GAGTGCT G GCGCTGG
124	TGGCAGC GGTAGTACACGA GCGAGAC	GTACTGC G GCTGACCA
128	AACGTGC GGTAGTACACGA CAGCGCA	TGCGCTG G ACCAGTT
131	ACGAACT GGTAGTACACGA GGCAGCG	CGCTGCC A AGCTTCT
133	GCAGAAC GGTAGTACACGA GTGGCAG	CTGGCAC G GTTCGAG
137	CGCGGNC GGTAGTACACGA GACGTGG	CCAGTTC G GTGCGCG
139	GCGCGGC GGTAGTACACGA ACGAAGT	ACGTTCT G GCGCGCC
142	CAGGCGC GGTAGTACACGA CGACGAA	TTCTTGC G GCGCTGG
144	CCCCAGC GGTAGTACACGA GCGCGCG	CGTCGCG G GCTTGGG
151	CCTGGGG GGTAGTACACGA CCGAGCG	CGCTGGG G GCGCCAG
159	CGCCAGC GGTAGTACACGA CTTGGGG	GCCGAGG G GCTGAGG
163	CAGCGCG GGTAGTACACGA CAGCCCT	CAGGGCT G GCGGCTG
166	GCACGAC GGTAGTACACGA CCGCAGC	GGCTGCG G GCTGTGC
170	CGTGCAC GGTAGTACACGA CAGCCGC	GCGGCTG G GTGACCG
172	CGGCTGC GGTAGTACACGA ACCAGCG	CGGCTGT G GCGCGCG
175	CTCCGCG GGTAGTACACGA TGCACAG	CTGTGCA G GCGGAGG
177	GTCCGCG GGTAGTACACGA GCTGCAC	GGTGCAG G GCGGGAC
183	CGCCGGT GGTAGTACACGA CCGCGCC	GCGGGG A ACCGGAG
188	AAAGCGC GGTAGTACACGA CGGCTCC	GGAGCCG G GCGGCTT
191	CGGAAGC GGTAGTACACGA CGCGGCT	ACCGGCG G GCTTTCG
198	CAGCGCG GGTAGTACACGA GGAAGGC	GGCTTCC G GCGGCTG
200	ACCAGGC GGTAGTACACGA GCGAAGC	CTTTCGC G GCGTGT
202	CCACAGC GGTAGTACACGA GCGGAGG	TTCCGCG G GCTGTGG
206	TGGGCCAC GGTAGTACACGA CAGCGCC	GCGGCTG G GTGAGCA
209	CATCGGC GGTAGTACACGA CACGAGG	CGCTGTG G GCGGCTG
214	CCAGGAC GGTAGTACACGA TGGCGAC	GTGACCA G GTGCTGG

Table 16

216	CACGAGGC	GGCTAGCTACACGA	ACTGGGCC		GGCCCAAT	G	GGCTGTRG
221	AGGCACAC	GGCTAGCTACACGA	CAGGCACT		ATGTCCTG	G	GTGTGCTG
223	GCACGCAC	GGCTAGCTACACGA	ACAGACGA		TGCTGTGT	G	GTGCTGTC
225	GAGCAGGC	GGCTAGCTACACGA	ACACAGG		CCGTGTGT	G	GGCTGGCC
227	CAGGGCAC	GGCTAGCTACACGA	GCACACCA		TGGTGTGC	G	GTGCTCTG
229	CCGAGGGC	GGCTAGCTACACGA	ACGACAC		GTGTGCTG	G	GGCTGTGG
237	CGTGTGGT	GGCTAGCTACACGA	CCGAGGGC		GGCTTGGG	A	ACGACAGG
239	GGCCGTGC	GGCTAGCTACACGA	GTCCCAAG		CCCTGGAC	G	GGACGGCC
241	GGGCCGTT	GGCTAGCTACACGA	GGTTCUA		TGGGAGCC	A	ACGAGCCG
244	GGGGCGGC	GGCTAGCTACACGA	GGTGCATC		GAGGCACG	G	GGCGCCCC
247	CGGGGGGC	GGCTAGCTACACGA	GGCTGTGC		GCACGGCC	G	GGCCGCCG
254	GGGGGGGC	GGCTAGCTACACGA	GGGGGGGG		GGCCCTCC	G	GGCGGCCC
257	GAGGGGGC	GGCTAGCTACACGA	GGCGGGGG		CCCGGGCC	G	GGCCCTTC
270	CACCTGGC	GGCTAGCTACACGA	GGAGGAG		CTCTTTCC	G	GGCAGGTG
275	CAGGACAC	GGCTAGCTACACGA	CTGGGGBA		TCCGCCAG	G	GTGTCTGT
277	GGCAGGAC	GGCTAGCTACACGA	ACCTGGGG		GGCAGGTT	G	GTCTTTGC
282	CTTCAGGC	GGCTAGCTACACGA	AGGACACC		GGTGTCTT	G	GGCTGAG
292	CACGAGGC	GGCTAGCTACACGA	TCTTTGAG		CTUAGGGA	G	GCTGGTGG
296	CGGGCCAC	GGCTAGCTACACGA	CAGCTCTT		AGAGGCTG	G	GTGGTCCG
299	ACTCGGGC	GGCTAGCTACACGA	CACGAGCT		AGCTGGTG	G	GGCCGAGT
305	TGAGGAC	GGCTAGCTACACGA	TGGGACCA		TGGCCCGA	G	GTGCTGCA
307	TCTGGAGC	GGCTAGCTACACGA	ACTCGGGC		GGCCGAGT	G	GCTGGGGA
310	GGCTCTGC	GGCTAGCTACACGA	AGCATTGG		CGAGTCTT	G	GCTAGAGC
316	CGGAGAGC	GGCTAGCTACACGA	CTTCGAG		CTGCAGAG	G	GCTGTGGG
319	GCTGGCAC	GGCTAGCTACACGA	AGCTCTTG		CAGAGGCT	G	GTGCGAGC
321	GGCTCTGC	GGCTAGCTACACGA	ACAGGCTC		GAGGCTGT	G	GGGAGGGC
325	CGCGGGGC	GGCTAGCTACACGA	TGGGACAG		CTGTGGGA	G	GGCGGGGG
327	GGCGGGGC	GGCTAGCTACACGA	GCTGGCAC		GTGGGAGC	G	GGGGGGGG
330	CTTCGGGC	GGCTAGCTACACGA	CGGGCTGG		CGAGCGCG	G	GGCGGAG
332	TCTTCGGC	GGCTAGCTACACGA	GGCGGGCT		AGCGCGCG	G	GGGAGGGA
339	CAGCAGCT	GGCTAGCTACACGA	TCTTCGGG		CGCGGAGA	A	AGTGTGTC

Table 16

341	GCCAGCAC	GECTAGCTACAAAG	GTCTTTCG	CGAAGAAC	G GTCTGCG
343	AGGCAGC	GECTAGCTACAAAG	AGTTTCTT	AAGAAGCT	G GCTGCGCT
347	CCGAAGGC	GECTAGCTACAAAG	CAGACGCT	ACGTGCTG	G GCTTTCGG
354	CGCAGAC	GECTAGCTACAAAG	CGAAGGCT	GGCTTTTC	G GCTTTCGG
359	ACGAGCG	GECTAGCTACAAAG	GAAGCGCA	TGCGCTTC	G GCTGCTCG
361	CCAGAGC	GECTAGCTACAAAG	CGGAAGCC	GGCTTTCG	G GCTGCTCG
364	CGTCAGC	GECTAGCTACAAAG	AGCGGAA	TTGCGGCT	G GCTGAGCG
369	GGCCCCGT	GECTAGCTACAAAG	CCAGCAG	GCTGCTG	A ACAGGAGCC
374	CCGCGAGC	GECTAGCTACAAAG	CCGTCTCA	TGGAAGGG	G GCGCCGCG
378	GGCCCCGC	GECTAGCTACAAAG	GGGCCCCG	CGGGGCTC	G GCGGGGGC
384	GGGGGGGC	GECTAGCTACAAAG	CCCCGGGG	CCGCGGGG	G GCGCCGCC
395	GTGAAGGC	GECTAGCTACAAAG	CTGGGGGG	CCGCGGAG	G GCTTTCAC
401	CTGGTGGT	GECTAGCTACAAAG	GAAAGGCT	AGGCTTTC	A ACCAGCAG
404	ACGCTGGT	GECTAGCTACAAAG	GGTGAGGG	CGTTTACC	A ACCAGCT
408	GGCAGCG	GECTAGCTACAAAG	TGGTGGTG	CACACACA	G GCGTGGC
410	CTGCGCAC	GECTAGCTACAAAG	GCTGGTGG	CCGAGAG	G GTGCGGAG
412	AGCTGGGC	GECTAGCTACAAAG	AGCTGGT	ACGAGGCT	G GCGCAGCT
414	GTAGTGGC	GECTAGCTACAAAG	GCAGGCTG	CAGGCTGC	G GCAGCTAC
417	CAGGTAGC	GECTAGCTACAAAG	TGGCGAGG	CGTGCGCA	G GCTACTGG
420	GGGCGAGT	GECTAGCTACAAAG	AGCTGGC	GGGAGCT	A ACCCTGCC
424	TGTTGGGC	GECTAGCTACAAAG	AGGTAGCT	AGCTACT	G GCCCAACA
429	CACGGTGT	GECTAGCTACAAAG	TGGGCGGG	CTGCGCCA	A ACAGGTTG
431	GTGACGCT	GECTAGCTACAAAG	GTTGGGCA	TGCCCAAC	A ACAGTAC
434	TGGTTCAC	GECTAGCTACAAAG	CGTGGTGG	CGAACAGC	G GTGACCGA
437	GGTTCGGT	GECTAGCTACAAAG	CACGTTGT	ACAGGTTG	A ACCGAGCG
441	CAGTGGCT	GECTAGCTACAAAG	CGGTGACC	GGTGACCG	A ACAGTCTG
443	CGCATGGC	GECTAGCTACAAAG	GTGGGTCA	TGACCGAC	G GCAGTGG
445	CCGCGAGT	GECTAGCTACAAAG	GGTGGTGT	ACGAGGCG	A ACTGGGCG
448	TCCGCCGC	GECTAGCTACAAAG	AGTGCGTC	GGCGGACT	G GCGGGGGA
456	CGCCCGGC	GECTAGCTACAAAG	TCCCGCGC	GGCGGGGA	G GCGGGGCG
461	CCGACGCG	GECTAGCTACAAAG	CCCGCTCC	GGAGCGGG	G GCGTGGCG

Table 16

463	GCCTCCAC	GGCTAGCTACAAAG	GGCGGCT	AGCGGGG	G	GTGGGGG
469	GGAGAGC	GGCTAGCTACAAAG	CCCAAGC	GGGTGGG	G	GCTGTGC
472	GGAGAGC	GGCTAGCTACAAAG	AGCGCCA	TGGGGCT	G	GCTGTGC
475	GGCGAGC	GGCTAGCTACAAAG	AGAGGCC	GGGAGCT	G	GCTGTGC
478	GGCGAGC	GGCTAGCTACAAAG	AGAGCAG	CTGTGCT	G	GGCGCGG
480	CAGCGGC	GGCTAGCTACAAAG	GGAGCAG	GCTGTGC	G	GGCGGGG
483	GCCTACGC	GGCTAGCTACAAAG	GGGCGAG	GGTGGCC	G	GGTGGG
485	TGGCCAC	GGCTAGCTACAAAG	GGGGCCA	TGGCCGC	G	GTGGGGA
489	GTGTTCG	GGCTAGCTACAAAG	CGACGCG	CGGCTGG	G	CGGAGAC
492	AGGTGCT	GGCTAGCTACAAAG	CGCCGAG	CGTGGGG	A	AGGAGTG
495	CAGCAGT	GGCTAGCTACAAAG	GTTGGCC	GGCGAGC	A	AGGTGCT
497	ACGAGCAG	GGCTAGCTACAAAG	GTGTGCG	GGCGAGC	A	AGGTGCT
499	GAACGAG	GGCTAGCTACAAAG	AGGTGCT	GGCGAGC	A	AGGTGCT
503	AGGTGAG	GGCTAGCTACAAAG	CAGCAGT	GGCGAGC	A	AGGTGCT
507	CAGCAGT	GGCTAGCTACAAAG	AGGTGCT	GGCGAGC	A	AGGTGCT
511	GTGCGAG	GGCTAGCTACAAAG	AGGTGCT	GGCGAGC	A	AGGTGCT
515	CAGCGAG	GGCTAGCTACAAAG	CAGCAGT	GGCGAGC	A	AGGTGCT
517	CGGCGAG	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
519	GGCGAGC	GGCTAGCTACAAAG	GGCGAGC	GGCGAGC	A	AGGTGCT
522	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
524	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
526	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
533	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
535	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
539	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
542	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
549	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
552	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
554	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
558	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT
563	AGGAGGC	GGCTAGCTACAAAG	CGGCGAG	GGCGAGC	A	AGGTGCT

Table 16

565	GCCCGCAC	GGCTAGCTACAAACGA	ACCTGGTA	TACCAAGT	G GTGCGGCG
567	CGCCCGCG	GGCTAGCTACAAACGA	ACACCTGG	CGAGGTGT	G GCGGGCGG
571	CGCGCGCG	GGCTAGCTACAAACGA	CGCGCAC	GTGTGCGG	G GCGCGCGG
574	ACAGCGCG	GGCTAGCTACAAACGA	GGCGCGAC	TGCGGGCC	G GCGGTGT
577	GGTACAGC	GGCTAGCTACAAACGA	GGCGGCC	GGCGCGCG	G GCTGTACC
580	GCTGGTAC	GGCTAGCTACAAACGA	AGCGGCGG	CGCGCGGT	G GTACAGCG
582	GAGCTGGT	GGCTAGCTACAAACGA	ACGCGCGC	GGCGGTGT	A ACAGCTC
586	CGCGGAGC	GGCTAGCTACAAACGA	TGGTACAG	CTGTACCA	G GCTCGGGG
591	GGCAGGCG	GGCTAGCTACAAACGA	CGAGCTGG	CGAGCTGG	G GCGCTGCG
593	GTGGCAGC	GGCTAGCTACAAACGA	GGCGAGCT	AGCTGGCG	G GCTGCGAC
596	TGAGTGGC	GGCTAGCTACAAACGA	AGCGCGCA	TGGGGGCT	G GCGACTCA
599	GGCTGAAT	GGCTAGCTACAAACGA	GGCAGCGC	GGCTGGCC	A ACTCAGGAC
605	GGCCGGGC	GGCTAGCTACAAACGA	CTGAGTGG	CGACTGAG	G GCGCGGCG
610	GGGGGGAC	GGCTAGCTACAAACGA	CGGGCGTG	CAGGGCGG	G GCGCCCGG
616	CGTGTGGC	GGCTAGCTACAAACGA	GGGGCGCG	CGGCGCGC	G GCGCACCG
619	TAGCGTGT	GGCTAGCTACAAACGA	GGCGGGGG	CGCCGGCG	A ACGCGCTA
621	ACTAGGCT	GGCTAGCTACAAACGA	GTGGCGGG	CGCGCCAC	A ACGCTAGT
623	CCACTAGC	GGCTAGCTACAAACGA	GTGTGGCG	GGCGACAC	G GCTAGTGG
627	GGGTCCAC	GGCTAGCTACAAACGA	TAGCGTGT	ACAGGCTA	G GTGGACCC
631	TTGCGGGT	GGCTAGCTACAAACGA	CCACTAGC	GCTAGTGG	A ACCCGGAA
640	CCAGAGCG	GGCTAGCTACAAACGA	CTTGGGGG	CGCGGAGG	G GCGTCTGG
642	TCCAGAGC	GGCTAGCTACAAACGA	GGTTCGGG	CGGAGGCG	G GTCTGGGA
649	GTTCGCAT	GGCTAGCTACAAACGA	CCGACAGG	GGTCTGGG	A ATGCGAAC
651	CGTGTGGC	GGCTAGCTACAAACGA	ATCCAGGA	TCTGGGAT	G GCGAACCG
655	AGGCGCGT	GGCTAGCTACAAACGA	TGGATCC	GGATGGCA	A ACGGGGCT
659	TTCCAAGC	GGCTAGCTACAAACGA	CGTTCGCG	GGGAGCGG	G GCGTGGAA
666	GCTATGGT	GGCTAGCTACAAACGA	TCCAGGCG	GGCTCGGA	A ACCATAGC
669	GACGCTAT	GGCTAGCTACAAACGA	GTTTCGAG	CTGGGAAC	A ATAGCGTC
672	CTGACGCG	GGCTAGCTACAAACGA	TATGGTTC	GGACCTAA	G GCGTCAAG
674	TCCCTGAC	GGCTAGCTACAAACGA	GCTATGGT	ACCATAGC	G GTCAAGGA
683	ACCGGGCG	GGCTAGCTACAAACGA	CTCCCTGA	TCAAGGAG	G GCGGGGCT

Table 16

689	AGGGGAC GGTAGTACACGA CCGGGCT	AGGCTGGG G GTCTGCT
699	TGGCAGG GGTAGTACACGA CCAAGGG	CGGCTGG G GCTTGGC
703	GGCTGGC GGTAGTACACGA AGGCGCG	CTGGGCT G GCGAGCC
707	CGGGGGC GGTAGTACACGA TGGAGGC	GCTTGGC G GCGCGGG
714	CTTGGAC GGTAGTACACGA CCGGGCT	AGGCGGG G GTGGGAG
716	CTCTGGC GGTAGTACACGA ACCGGGG	CCCGGGT G GCGAGAG
724	CCCGGGC GGTAGTACACGA CTCTGGC	GCGAGAG G GCGCGGG
726	GCGCGGC GGTAGTACACGA GCTCTTC	GAGAGGC G GCGGGGG
732	GCGCTGC GGTAGTACACGA CCGGGGC	GCGGGG G GCGTGGC
735	GCTGGAC GGTAGTACACGA TGGCGCG	CGGGGCA G GTGGGAC
737	CGGCTGC GGTAGTACACGA ACTGGCC	GGGGAGT G GCGAGCG
741	ACTTGGC GGTAGTACACGA TGGGACTG	CAGTGGC G GCGGAGT
747	CGGGGAC GGTAGTACACGA TTGGGCTG	CAGCGGA G GTCTGGG
751	GCAAGGC GGTAGTACACGA AGACTTGG	CGTAGTCT G GCGGTTC
754	TGGGAGC GGTAGTACACGA GCGAGCT	AGTCTGC G GTTGGCA
757	TCTTGGC GGTAGTACACGA AACGGAG	CTGGCCTT G GCGGAGA
766	GCTGGGC GGTAGTACACGA CTCTTGG	CCAGAG G GCGGAGC
772	GCGGAGC GGTAGTACACGA CTGGGCT	AGGCGAG G GCGTGGG
774	AGCGGAC GGTAGTACACGA GCTGGGC	GCGGAGC G GTGGGCT
777	GCGAGGC GGTAGTACACGA CAGGCTG	CAGGCTG G GCGTGGC
779	GCGGAGC GGTAGTACACGA GCGAGGC	GGCTGGC G GCTGGCC
782	TGAGGGC GGTAGTACACGA AGGCGAC	GTGGGCT G GCGCTGA
790	GCTCGGC GGTAGTACACGA TCGGGCT	GCGCTGA G GCGGAGC
796	GCTCGGC GGTAGTACACGA TCGGGCT	GAGCGGA G GCGGAGC
800	AGGGGCT GGTAGTACACGA CCGCTCG	CGGAGCG A AGCGGCT
802	CAAGGGC GGTAGTACACGA GTCCGCTC	GAGGAG G GCGGTTC
806	TGCGGAC GGTAGTACACGA GCGGCTC	GAGGCGC G GTTGGCA
811	ACCGTGC GGTAGTACACGA CCAAGGG	CGGTTGG G CGAGGGT
817	CCAGGAC GGTAGTACACGA CCGTGGC	GCGAGGG G GTCTGGG
824	GCGTGGC GGTAGTACACGA CAGGAGC	GCTCTGG G GCGAGCC
828	GCGGGCT GGTAGTACACGA GCGGCGG	CTGGGCG A AGCGGAG

Table 16

834	CGTCTGCG	GGCTAGCTACAACGA	CCGGTGCG		CCACCCCG	G	GCAGGACG
839	CCACGGGT	GGCTAGCTACAACGA	CCTGCCCG		CGGGCAGG	A	ACGGTGCG
841	GTCTCAGC	GGCTAGCTACAACGA	GTCTTGCC		GGCAGGAC	G	GGTGAGAC
843	CGTCCAC	GGCTAGCTACAACGA	GGTCTCTG		CAGGACCC	G	GTGGACCG
847	CAGTCGGT	GGCTAGCTACAACGA	CCACGGGT		ACCGTGCG	A	ACCGAGTG
852	ACGGTCAC	GGCTAGCTACAACGA	TGGGTCCA		TGGACCGA	G	GTGACGGT
855	ACCAACGG	GGCTAGCTACAACGA	CAGCTCGT		ACCGAGTG	A	ACCGTGCT
858	GAACACAC	GGCTAGCTACAACGA	GGTCACTC		GAGTGACC	G	GTGGTGTC
861	ACGAAAC	GGCTAGCTACAACGA	CAGGTCCA		TGACCGTG	G	GTGTTGCT
867	CACCAAC	GGCTAGCTACAACGA	AGAGTCCA		TGGTTCTT	G	GTGGTGCG
869	GACACAC	GGCTAGCTACAACGA	ACAGTAAC		GTGTTCTT	G	GTGGTGCT
872	GGTGAAC	GGCTAGCTACAACGA	CACACAGA		TCTGTGTG	G	GTGTACCC
874	CAGGTGAC	GGCTAGCTACAACGA	ACCAACA		TGTGTGCT	G	GTGTACCG
877	TGGCAGGT	GGCTAGCTACAACGA	GACACACC		TGTGACCT	G	GGCAGACC
881	GGTCTGCG	GGCTAGCTACAACGA	AGGTGACA		CCTGCCAG	A	ACCGGCGG
886	CGCCGGGT	GGCTAGCTACAACGA	GTGGCAGG		CGAGACCC	G	GGCGAAGA
890	TCTTCCGC	GGCTAGCTACAACGA	GGTCTGCG		CGAAGAGA	G	GGCACCTC
899	GGGTGCG	GGCTAGCTACAACGA	TCTTCCGC		AAGAGACC	A	ACCTCTTT
902	AAAGAGGT	GGCTAGCTACAACGA	GGTCTGCT		TTTGGAGG	G	GTGGCGTC
915	GAGCGCAC	GGCTAGCTACAACGA	CCTCCAAA		TGGAGGGT	G	GGGCTCTC
917	GAGAGCGC	GGCTAGCTACAACGA	ACCTCCAA		GAGGTGCG	G	GGTCTCTG
919	CAGAGAGC	GGCTAGCTACAACGA	GAACCTTC		GGTCTCTG	G	GGTCTCTG
927	GGCGGTGC	GGCTAGCTACAACGA	CAGAGAGC		GGTCTCTG	G	GGTCTCTG
929	TGGCGGCT	GGCTAGCTACAACGA	GGTCTCTG		TCTCTGCG	A	ACCGCGCA
931	AGTGGCGC	GGCTAGCTACAACGA	GTGCGAGA		TCTGGGAC	G	GGCGGCGT
933	GGAGTGGC	GGCTAGCTACAACGA	GGTGTCCA		TGGGACGC	G	GGCAGTCC
936	GTGGAGGT	GGCTAGCTACAACGA	GGCGGTGG		CAGCGGCC	A	ACTTCCAC
942	GGATGGGT	GGCTAGCTACAACGA	GGGAGTGG		CGACTGCC	A	ACCGATCC
946	CCAAGGAT	GGCTAGCTACAACGA	GGGTGGGA		TCCACACC	A	ATCGGTGG
950	CGGCTCAC	GGCTAGCTACAACGA	GGATGGGT		ACCGATCC	G	GTGGGCGG
954	CTGGCGGC	GGCTAGCTACAACGA	CACGGGAT		ATCGGTGG	G	GGCGGCGA

Table 16

957	GTGCTGGC GECTAGCTACAACGA GGCCTCAG	CGTGGGCG G GCTACAC
961	CGTGTGCG GECTAGCTACAACGA TGGGGGCG	GGTCGCGA G GCACGCG
963	CGCTGTGT GECTAGCTACAACGA GCTGGCGG	CGCGGAC A ACCAGCG
966	GGCGGGGT GECTAGCTACAACGA GGTGTGG	CGGCGCC A AGCGGGG
968	GGGCGCGC GECTAGCTACAACGA GTGGTGCT	AGCACGAC G GCGGGCG
972	TGGGGGGC GECTAGCTACAACGA CGGTGG	CGAGCGG G GCGCGCG
979	ATGTGGAT GECTAGCTACAACGA GGGGGGCG	GGCGCGCG A ATCGAT
983	CGGATGT GECTAGCTACAACGA GGATGGG	CGCATCC A AGCGCG
985	GGCGCAT GECTAGCTACAACGA GTGGTGG	CGATCGC A ATCGCG
988	GTGGCGCG GECTAGCTACAACGA GATGTGGA	TCACATC G GCGGGCG
991	GTGGTGGC GECTAGCTACAACGA CGCATGT	ACATCGG G GCGACCG
994	GAGTGGT GECTAGCTACAACGA GCGCGCGA	TCGCGGCG A ACCAGTC
997	AGGGAGCT GECTAGCTACAACGA GGTGGCGG	CGCGGCG A AGTGGCT
999	CGAGGAG GECTAGCTACAACGA GTGGTGGC	GCACCGC G GTCCTGG
1008	AGCGTGT GECTAGCTACAACGA CCGAGGGA	TCGCTGG A AGAGGCT
1010	CAAGGCGT GECTAGCTACAACGA GTCCGCG	CGTGGG A AGCTTGG
1012	GACAGGCG GECTAGCTACAACGA GTGTCCGA	TGGGACAC G GCTTGTG
1017	CGGGGAGC GECTAGCTACAACGA AAGGGGTG	CAGGCTT G GTCGCGG
1025	GGTACAC GECTAGCTACAACGA CGGGGAC	GTGCGCG G GTGTAGC
1027	CGGCTTAC GECTAGCTACAACGA ACCGGGG	CGCGCGT G GTACGCG
1029	CTGGCGGT GECTAGCTACAACGA ACACGGG	CGCGTGT A AGCGCG
1031	GTCTGGC GECTAGCTACAACGA GTTACCG	CGGTGTAC G GCGAGAC
1037	TGCTTGT GECTAGCTACAACGA CTGGCGT	AGCGCGG A ACCAGCG
1042	GGAGTGC GECTAGCTACAACGA TTGCTCTC	GAGACCG A GCGTTC
1044	GAGGAAT GECTAGCTACAACGA GCTTGTCT	GACGAGC A ACTGCTC
1053	TGAGGAT GECTAGCTACAACGA AGAGGAAG	CTTCTCT A ACTCTCA
1062	CTTGTCCG GECTAGCTACAACGA CTGGGAG	CTCTCG G GCGACAG
1065	CTCTTGT GECTAGCTACAACGA GCGGTGAG	CTGAGCG A AGAGGAG
1072	GACGTGC GECTAGCTACAACGA TCCTGTCT	GACGAGA G GCGGTGC
1075	GGCGGAG GECTAGCTACAACGA TGCTCTT	AAGGAGA G GCTCGCG
1078	AGGGCGCG GECTAGCTACAACGA AGCTGTCT	GAGGAGT G GCGGCGT

Table 16

1081	AGGAGGC GGTAGCTACACGA CGAGCTG	CAGCTGCG G GCGTCTCT
1093	AGCTGAGT GGTAGCTACACGA AGGAGGA	TGCTTCTT A ACTGAGCT
1098	CAGAGAG GGTAGCTACACGA TGAGTAG	GCTACTCA G GCTCTCTG
1108	GCGTGGC GGTAGCTACACGA CTCAGAA	TCTCTGAG G GCGCAGCC
1113	AGTCAGGC GGTAGCTACACGA TGCGCTC	GAGGCCA A ACTTGACT
1118	GCGCGAGT GGTAGCTACACGA CAGCTGG	CGAGCTG A GCTGGCC
1122	CCGAGGCG GGTAGCTACACGA CAGCTGG	CCTGACTG G GCGCTCGG
1124	CTCGAGC GGTAGCTACACGA GCCAGTC	TGACTGGC G GCTCGGAG
1132	CCAGAGC GGTAGCTACACGA CTCGAGC	GCTCGGAG G GCTCTGCG
1136	GTCTCAC GGTAGCTACACGA GAGCTCC	GGAGGCTC G GTGAGAGC
1142	AGATGGT GGTAGCTACACGA CTCACGA	TGCTGGAG A ACCATCTT
1145	AGAGAGT GGTAGCTACACGA GGTCTCA	TGAGAGCC A ATCTTCT
1155	CCTGGAGC GGTAGCTACACGA CAGAGAG	CTTCTCTG G GTTCGAGG
1162	TCCAGGCG GGTAGCTACACGA CTGGAAC	GGTTCTCG G GCGCTGGA
1169	CTTGGCAT GGTAGCTACACGA CAGAGCC	GGCCCTCG A ATGCGAGG
1171	TGCTTGGC GGTAGCTACACGA ATCAGGG	CCCTGGAT G GCACAGGA
1178	CGGGGAGT GGTAGCTACACGA CCTGGCA	TGCCAGGG A ACTTCCCG
1185	CNACTGC GGTAGCTACACGA GGGGAGTC	GACTCCCC G GCGAGTTC
1189	GGAGCAC GGTAGCTACACGA CTCGCGGG	CCCGCAG G GTTGCCCC
1192	GCGGCGC GGTAGCTACACGA AACCTGCG	CGAGGTT G GCGCCGCG
1197	GGCAGGC GGTAGCTACACGA GGGGCAAC	GTTCGCC G GCTTCC
1201	GCTGGGGC GGTAGCTACACGA AGCGGGGG	CGCTGCT G GCGCCAGC
1207	AGTAGCC GGTAGCTACACGA TGGGGCAG	CTGCCCCA G GCGTACT
1209	CCAGTAGC GGTAGCTACACGA GCTGGGCG	GCTCCAGC G GGTACTGG
1212	TTGCCAGT GGTAGCTACACGA AGCGCTGG	CGAGGCT A ACTGGCAA
1216	GCATTTC GGTAGCTACACGA CAGTAGCT	GCTACTG G GCAATTC
1220	GGCCGCAAT GGTAGCTACACGA TTGCCAGT	ACTGGCAA A ATCGGCC
1222	GCGGCGCG GGTAGCTACACGA ATTGGCA	TGGCAAT G GCGGCGCC
1225	ACAGGGCG GGTAGCTACACGA CGATTTG	CAATGG G GCGCTGT
1231	CCAGAAC GGTAGCTACACGA AGGGCGCG	GCGGCGCT G GTTCTGG
1240	CNAGCAC GGTAGCTACACGA TCCAGAA	TTCTGGA G GCTGCTTG

Table 16

1243	TCCCAAGC	GGCTAGCTACAACGA	AGCTCCAG		CTGGAGCT G	GCTTGGA
1251	CGCTGGT	GGCTAGCTACAACGA	TCCCAAGC		GGTTGGGA A	ACCAAGG
1254	CTGGCGT	GGCTAGCTACAACGA	GGTTCCA		TGGGAAC A	ACGCGAG
1256	CATGCGC	GGCTAGCTACAACGA	GTGTTC		GGAAACAC G	GGGCGGTG
1258	GGCACTGC	GGCTAGCTACAACGA	GGTGTGT		AACCAACG C	GGATGTCC
1261	AGGGGCAC	GGCTAGCTACAACGA	TGCGGTG		CACGCGCA G	GTGCGCTT
1263	GTAGGGGC	GGCTAGCTACAACGA	ACTGGCG		CGCGAGT G	GGCCCTAC
1269	CACCCCT	GGCTAGCTACAACGA	AGGGGCAC		GTGCTCTT A	ACGGGGTG
1274	AGGAGAC	GGCTAGCTACAACGA	CCGTAGG		GCTACGGG G	GTGCTCTT
1276	TGAGGAGC	GGCTAGCTACAACGA	ACCCGTA		TACGGGTT G	GCTCTCTA
1286	CAGTGGT	GGCTAGCTACAACGA	CTTGAAGA		TCCTCAAG A	ACGACGTG
1288	GGCACTGC	GGCTAGCTACAACGA	GTCTTAG		CTCAAGAC G	GGACTGCG
1290	CGGGCAGT	GGCTAGCTACAACGA	GGTCTTG		CAGACAGC A	ACTGCGCG
1293	CAGGGRAC	GGCTAGCTACAACGA	AGTGGCTC		GAGGCACT G	GGCTCGTG
1297	CTCGAGC	GGCTAGCTACAACGA	GGGCAATG		CAGTCGCG G	GCTCGAG
1300	CAGCTGCG	GGCTAGCTACAACGA	AGCGGCA		TGCGCGCT G	GGGAGCTG
1304	ACCGAGC	GGCTAGCTACAACGA	TGCGACG		CGCTGCA G	GCTGGGTT
1307	GTGACGCG	GGCTAGCTACAACGA	AGCTGGA		TGCGAGCT G	GGGCTAC
1310	GGGGTAC	GGCTAGCTACAACGA	CGAGCTC		GAGCTGCG G	GTACCCCG
1313	CGTGGGT	GGCTAGCTACAACGA	GACCGGAG		CTGCGGTC A	ACCCGAG
1319	CGGGCTGC	GGCTAGCTACAACGA	TGGGTTGA		TACGCCCA G	GGAGCCGG
1322	ACACCGGC	GGCTAGCTACAACGA	TGTTGGG		CCCGAGCA G	GGCGTTGT
1326	ACAGACAC	GGCTAGCTACAACGA	CGGCTGT		AGCACCGG G	GTGTCTGT
1328	GTACAGAC	GGCTAGCTACAACGA	ACCGGCTG		CAGCGGTT G	GTCTGTGC
1332	CCGGGCAC	GGCTAGCTACAACGA	AGACACG		CGGTGTCT G	GTGCCCGG
1334	TCCCGGGC	GGCTAGCTACAACGA	ACAGACG		GTGTCTGT G	GGCCCGGA
1345	CTGAGGGC	GGCTAGCTACAACGA	TTCCTCC		CGGAGAAA G	GGCCACAG
1353	CACAGAGC	GGCTAGCTACAACGA	CTTGGGG		GGCCGAGG G	GCTCTGTG
1358	GGCCGCAC	GGCTAGCTACAACGA	AGAGCCCT		AGGGCTGT G	GTGGCGGC
1361	GGGGCTGC	GGCTAGCTACAACGA	CACAGAGC		GCTCTGTG G	GGGGCTCC
1364	TGCGGGGC	GGCTAGCTACAACGA	CGCACAG		CTGTGGCG G	GGCCCGCA

Table 16

1380	GTCTGTGT	GGCTAGCTACAACGA	CTCTCTCC		GGAGGAGG A ACACAGAC
1382	GGGTCTGT	GGCTAGCTACAACGA	GTCTCTCT		AGGAGGAC A ACACAGCT
1386	ACGGGGGT	GGCTAGCTACAACGA	CTGTGTCT		GGACACAG A ACCCGCT
1392	CAGCGGAC	GGCTAGCTACAACGA	GGGGGTCT		AGACCCCC G GTGCGCTG
1395	CACCAAGC	GGCTAGCTACAACGA	GACGGGGG		CCCGGCTC G GCTGTGTG
1400	AGCTGCAC	GGCTAGCTACAACGA	CAGGGGAC		GTGCGCTG G GTGCGCTG
1402	GCAGCTGC	GGCTAGCTACAACGA	ACGAGGCG		GGCTGTGT G GCGCTGCG
1405	GGCGGAGC	GGCTAGCTACAACGA	TGCAACAG		CTGTGTGA G GCTGTCTC
1408	GGCGGAGC	GGCTAGCTACAACGA	AGCTGCAC		GTGCGAGT G GCTCTCGC
1413	GTCTGTGC	GGCTAGCTACAACGA	GGAGGAGC		GTCTGTCT G GCGAGCAC
1417	TGCTGTGC	GGCTAGCTACAACGA	TGGCGGAG		CTCGGCA A GCAACAGA
1419	GTCTGTGT	GGCTAGCTACAACGA	GCTGGGCG		CGCCGAGC A ACAGGAGC
1422	GGGGCTGC	GGCTAGCTACAACGA	TGTGTGTG		CGAGCACA G GCGGCCCC
1425	CCAGCGGC	GGCTAGCTACAACGA	TGCTGTGC		GCACAGA G GCGGCTGG
1432	ACAGCTGC	GGCTAGCTACAACGA	CAGGGGCT		AGCGGCTG G GCGGCTGT
1436	CGGTACAC	GGCTAGCTACAACGA	CTGCCAGG		CTGTGCGAG G GTGTACGG
1438	AGCGGTAC	GGCTAGCTACAACGA	AGCTGTGA		TGCGAGGT G GTACGCGT
1440	GAAGCGGT	GGCTAGCTACAACGA	ACAGCTGC		GCAGGTGT A ACGGCTTC
1443	CACGAGGC	GGCTAGCTACAACGA	CGTACACC		GGTGTACG G GCTTGTGT
1448	GCCCGCAC	GGCTAGCTACAACGA	GAAGCGGT		ACGGCTTC G GTGCGGGC
1450	AGGCGCGC	GGCTAGCTACAACGA	AGGAAGCC		GGCTGTGT G GCGGCGCT
1454	AGGCAGGC	GGCTAGCTACAACGA	CGGACAGA		TGTTGCGG G GCGTGTCT
1458	GCGCAGGC	GGCTAGCTACAACGA	AGGCCGCG		GCGGGCTCT G GCTTGTGC
1462	GCGCGCGC	GGCTAGCTACAACGA	AGGCAGGC		GCCTGTCT G GCGCGGAC
1464	CAGCGCGC	GGCTAGCTACAACGA	CGAGGCGG		CTGCGTGC G GCGGCGCT
1468	GCAACAGC	GGCTAGCTACAACGA	CGGCGGAG		CTGCGCGG G GCTGTGTG
1472	GCGGCGAC	GGCTAGCTACAACGA	CAGCGCGC		GCGGCGCT G GTGCGCCC
1474	CTGGGGGG	GGCTAGCTACAACGA	ACGAGCGG		CGGCTGTGT G GCGGCGAG
1482	CCAGAGGC	GGCTAGCTACAACGA	CTGGGGGG		GCCCCGAG G GCTCTTGG
1491	CTGTGAGC	GGCTAGCTACAACGA	CCGAGGCG		GCTGTGAG G GCTTCCAG
1498	CGTGTGTG	GGCTAGCTACAACGA	CTGGAGCC		GGCTCCAG G GCGAGGCG

Table 16

1500	TTCTTTGT GGTAGCTACAAAG	GGCTGGAG		CTCCAGGC A ACAAGAA
1503	GGTTTGGT GGTAGCTACAAAG	TGTGCTTG		CAGGCACA A AGCAAGC
1507	AGCGGGGT GGTAGCTACAAAG	TGTTTGTG		CACACAA A AGCGCGT
1509	GAAGCGGC GGTAGCTACAAAG	GTTCGTTC		CACAGAAC G GCGCGTTC
1512	GAGGAAGC GGTAGCTACAAAG	GGCGTTGG		CGAAGGCG G GCTTCTTC
1524	CTTGTTGT GGTAGCTACAAAG	TCTGAGG		CCTCAGGA A ACAAGAG
1526	TTCTTTGT GGTAGCTACAAAG	GTTCGGA		TCAGGAAC A ACAGAG
1534	AGATGAAC GGTAGCTACAAAG	TCTTTGTT		ACCAAGAA G GTTCATCT
1538	AGGGAGAT GGTAGCTACAAAG	GAAGTTCT		AGAAGTTC A ATCTGCT
1552	TGGCATGC GGTAGCTACAAAG	TTCGCCAG		CTGGGAA G GATGCGA
1554	CTTGCCAT GGTAGCTACAAAG	GGTTCCCC		GGGGAAGC A ATGCCAAG
1556	AGCTTGCC GGTAGCTACAAAG	ATGCTTCC		GGAGCAT G GCGAAGT
1561	GCAGAGCC GGTAGCTACAAAG	TGCGATG		CATGCCAA G GCTCTGCG
1567	CTTCGAGC GGTAGCTACAAAG	GAGAGCTT		AAAGTCTC G GCTGAGG
1570	GTCTCTGC GGTAGCTACAAAG	AGCGAGAG		CTCTGCGT G GCGAGAGC
1576	AGGTGAGC GGTAGCTACAAAG	TCTGCGAG		CTCAGGA G GCTGAGCT
1580	TTCCAGGT GGTAGCTACAAAG	CAGTCTCT		AGAGCTG A AGTGGAA
1582	TCTTCGAC GGTAGCTACAAAG	GTGAGTTC		GAGCTGAC G GTGGAGA
1589	AGCTTCAT GGTAGCTACAAAG	CTTCCAG		CGTGGAG A ATGAGCT
1593	CCGCAAGC GGTAGCTACAAAG	TGCTCTTC		GAAGATGA G GGTGCGG
1595	TCTCCGAC GGTAGCTACAAAG	GCTCATCT		AGATGAGC G GTGGGGA
1597	AGTCCGCG GGTAGCTACAAAG	AGGTCAT		ATGAGCT G GCGGAGT
1602	AGCGCAGT GGTAGCTACAAAG	CCGCGAG		CTGCGGAG A ACTGCGT
1605	CCAGAGCG GGTAGCTACAAAG	AGTCCGCG		GCGGGACT G GCGCTTGG
1607	AGCCNAGC GGTAGCTACAAAG	GCGTCCCC		GGATGAC G GCTTGCTT
1612	TGCGCAGC GGTAGCTACAAAG	CNAGCGCA		TGCGCTTG G GTCGCGA
1615	TCTCTGCG GGTAGCTACAAAG	AGCCNAGC		GCTTGGCT G GGCNAGG
1617	GCTCTTGC GGTAGCTACAAAG	GCGGCCAA		TTCGCTTC G GCGNAGC
1623	CCCTGGGC GGTAGCTACAAAG	TCTTGCGC		GCCAGAG G GCCAGAG
1631	CAGCCAAC GGTAGCTACAAAG	CCCTGGGC		GCCAGAG G GTTGCTTG
1635	AACACAGC GGTAGCTACAAAG	CAACCCCT		AGGGTTTG G GCTGTGTT

Table 16

1638	CGGAAAC GGTAGCTACACGA AGCGACC	GGTGGCT G GTGTTCG
1640	GCCGAAAC GGTAGCTACACGA ACAGCAA	TTGGCTGT G GTTCGCG
1646	TCGTGGC GGTAGCTACACGA CGAGAAC	GTGTTCG G GTTCGCG
1649	TGCTTCG GGTAGCTACACGA GGTGGAA	TTCCGACC G GCAGACA
1654	GACGGTC GGTAGCTACACGA GTCTTCG	GCGGAGA G GCACGTC
1656	CNAGGCT GGTAGCTACACGA GCTCTCG	GCGAGAG A ACCGTCTG
1659	ACCGAAC GGTAGCTACACGA GGTGCTCT	AGAGACC G GTCTGCT
1663	CCTACGC GGTAGCTACACGA AGACGGTG	CACGCTCT G GAGTAGG
1665	CTGCTAC GGTAGCTACACGA GCAGACG	CCGCTGC G GTAGGAG
1673	GCAGGAT GGTAGCTACACGA CTCTTAC	GTGAGGAG A ATCTGCG
1679	AACCTGC GGTAGCTACACGA CAGGATCT	AGATCTG G GCGAATT
1684	GCAGGAC GGTAGCTACACGA TTGGTCAG	CTGGCCT G GTCTCTG
1690	GCCAGTC GGTAGCTACACGA AGGACTTT	AAGTTCT G GCATTCG
1692	CAGCCAGT GGTAGCTACACGA GAGGAGC	GTCTCTG A ACTGGTTC
1696	TCATCAGC GGTAGCTACACGA CAGTGCAG	CTGCACCT G GCTGATGA
1700	ACACTCAT GGTAGCTACACGA CAGCGAGT	ACTGGCTG A ATGAGTGT
1704	GTACACAC GGTAGCTACACGA CTATCAGC	GCTGATGA G GTGTGTAC
1706	ACTACAC GGTAGCTACACGA ACTCATCA	TGATGAT G GTGTACGT
1708	CGAGTAC GGTAGCTACACGA ACATCAT	ATGAGTGT G GTACGTG
1710	GAGGAGT GGTAGCTACACGA ACACACTC	GAGTGTGT A AGCTGCTC
1712	TCGACGAC GGTAGCTACACGA GTACACAC	GTGTGTAC G GTCTGCA
1715	AGCTGAC GGTAGCTACACGA GAGTATCA	TGTACGTC G GTCGAGCT
1720	TGAGCAGC GGTAGCTACACGA TCGACGAC	GTGTCGA G GCTGCTCA
1723	ACTGAGC GGTAGCTACACGA AGCTGAC	GTGAGCT G GCTGAGT
1729	AGAGAGC GGTAGCTACACGA CTGAGCAG	CTGCTCAG G GTCTTCT
1740	GCTGAGT GGTAGCTACACGA AAGAGAA	TTTCTTTT A ATGTACG
1742	TCGCTGAC GGTAGCTACACGA ATAAAGA	TCCTTAT G GTCAGGA
1745	GTCTCGT GGTAGCTACACGA GACATATA	TTTATGTC A AGGAGAC
1751	AACCTGGT GGTAGCTACACGA CTCCTGTA	TCAGGAG A ACCAGTCT
1754	TGAAAGCT GGTAGCTACACGA GGTCTCG	CGAGACC A AGCTTCA
1756	TTTGAAAC GGTAGCTACACGA GTGGTCTC	GAGACAC G GTTCAAA

Table 16

1767	GAGCTGT GGTAGTACAAAG TCTTTGA	TCAAGA A ACAGCTC
1771	AAAGAG GGTAGTACAAAG CTCTTT	AAAGAG G GCTCTTT
1782	CTTCGGT GGTAGTACAAAG AGAAG	CTTTTCT A ACAGAG
1791	CAGACAC GGTAGTACAAAG TCTTCGG	CCGAGAG G GTGTCAG
1793	CTCAGAC GGTAGTACAAAG ACTCTTC	GGAGAGT G GTCTGAG
1800	CACCTTC GGTAGTACAAAG TCTTCGA	TGTCGGA G GCAAGTG
1804	TTTGCAC GGTAGTACAAAG TCTTCGA	TGAGCAA G GTTCGAA
1807	TGCTTTC GGTAGTACAAAG AACTTGT	AGCAAGT G GCAAGCA
1812	TCCATTC GGTAGTACAAAG TTTGCA	GTTCGAA G GCAAGCA
1814	ATTCAT GGTAGTACAAAG CTCTTGA	TGCAAGC A ATTGAGT
1820	TGCTGAT GGTAGTACAAAG TCCATTC	GCTTGA A ATGAGCA
1825	ATGCTGT GGTAGTACAAAG CTGATTC	GGATCAG A ACAGCT
1828	TCAATGC GGTAGTACAAAG TGTCTGT	ATCAGCA G GCATGGA
1830	CTTCAAGT GGTAGTACAAAG GCTCTGT	CAGACAG A ACTGAG
1841	AGTCGAC GGTAGTACAAAG CTCTTGA	TGAGAG G GTGAGCT
1843	GCAGTTC GGTAGTACAAAG ACCTCTT	AAGAGT G GCAGCTC
1846	CCGAGAC GGTAGTACAAAG TGCACCT	AGGTGCA G GCTGCGG
1849	GCTCGAC GGTAGTACAAAG AGTGCAC	GTGAGCT G GCGGAGC
1855	CCGAGAC GGTAGTACAAAG TCCGAG	CTGCGCA G GCTGCGG
1858	CTTCGAC GGTAGTACAAAG AGCTCCG	CGAGAGT G GTGCGAG
1865	ACCTGAC GGTAGTACAAAG TTCCGAC	TGTGAA G GCAAGGT
1871	TGCTGAC GGTAGTACAAAG CTCTGCT	AAGAGAG G GTCAGCA
1876	GATGCTC GGTAGTACAAAG TGACCTC	GAGTCA G GCGCATC
1879	CCGATTC GGTAGTACAAAG TGCTGAC	GTGAGCA G GCATCGG
1881	TTCCGAT GGTAGTACAAAG GTCTGCT	CAGCAG A ATCGGAA
1889	GCTCTGC GGTAGTACAAAG TTCCGAT	ATCGGAA G GCGAGCC
1894	GGCTGAC GGTAGTACAAAG CTGCTTC	GAAGCAG G GCGGCCC
1898	AGCAGGC GGTAGTACAAAG GCGCTGG	CCAGCCC G GCGCTGCT
1903	AGTCAAG GGTAGTACAAAG AGGCGGG	CCGCGCT G GCTGAGT
1907	CTGAGCT GGTAGTACAAAG CAGCAGG	CCCTGCT A AGTCCAG
1909	GTCTGAC GGTAGTACAAAG GTCAAG	CTCTGAC G GTCCAG

Table 16

1915	AGCGAGT	GGCTAGCTACACGA	CTGAGCGT	ACGTCCAG A	ACTTCGCT
1920	GATGAGC	GGCTAGCTACACGA	GGAGTCTG	CAGAGTCC	G GCTTCATC
1925	TTGGGAT	GGCTAGCTACACGA	GAAGCGGA	TCGGCTTC	A ATCCCAA
1933	CGTCAGGC	GGCTAGCTACACGA	TTGGGGAT	ATCCCGAA	G GCGTGAAG
1938	CAGCCCGT	GGCTAGCTACACGA	CAGGCTTG	CAGGCTTG	A ACGGGCTG
1942	GGCGAGC	GGCTAGCTACACGA	CGGTGAG	CCTGACGG	G GCTGGGCG
1945	TCGGCCGC	GGCTAGCTACACGA	AGCCGTTC	GACGGGCT	G GCGGCGCA
1948	CAATCGGC	GGCTAGCTACACGA	CGAGCGC	GGCTGCGG	G GCGGATTG
1952	TTTCAGAT	GGCTAGCTACACGA	CGGCGCA	TGCGGCGG	A ATTGTGA
1959	ATGTTGAC	GGCTAGCTACACGA	TATCGGCG	GGCGGATT	G GTGGAACAT
1961	TAGTCAT	GGCTAGCTACACGA	GTTCACAA	GATTTGGA	A ACATGGAC
1965	GAGTAGT	GGCTAGCTACACGA	CATGTTTC	GAACATGG	A ACTGAGTC
1968	CACGAGCT	GGCTAGCTACACGA	AGTCCATG	CATGGACT	A ACSTCGTG
1970	CCGACGAC	GGCTAGCTACACGA	GTATGTCCA	TGGACTAC	G GTGCTGGG
1973	GCTCCGAC	GGCTAGCTACACGA	GACGTAGT	ACTAGCTC	G GTGGGAGC
1979	GTCTCGGC	GGCTAGCTACACGA	TCCACGGA	TGCTGGGA	G GCGAGAC
1985	CGAGAGCT	GGCTAGCTACACGA	TCTGGGTC	GAGCGAGA	A ACSTTCGG
1987	TGCGGAGC	GGCTAGCTACACGA	GTCTGGGC	GGCGAGAC	G GTTCGCGA
1992	TTCTCTGC	GGCTAGCTACACGA	GGAGCGTT	AACTTTC	G GCGAGAAA
2006	CGCTCGGC	GGCTAGCTACACGA	CGTCTTTT	AAAAGAG	G GCGGAGCG
2011	TGAGACGC	GGCTAGCTACACGA	TGGGCCCT	AGGGCGGA	G GGTCTCTA
2013	GGTGAGAC	GGCTAGCTACACGA	GCTGGGCG	GGCGAGC	G GGTTCAGC
2018	CTCGAGGT	GGCTAGCTACACGA	GAGAGGCT	AGCGTCTC	A ACCTTCAG
2027	GGCTTCAC	GGCTAGCTACACGA	CCTCGAGG	CCTCGAGG	G GTGAGAGC
2033	AACAGTGC	GGCTAGCTACACGA	CTTCACCC	GGGTGAAG	G GCACTGTT
2035	TGAACAGT	GGCTAGCTACACGA	GGCTTCAC	GTGAGAGC	A ACTCTTCA
2038	CGCTGAGC	GGCTAGCTACACGA	AGTGGCTT	AAGGACT	G GTTCAGCG
2043	GAGCAGAC	GGCTAGCTACACGA	TGAGACGT	ACTGTTCA	G GGGTGCTC
2045	TTGAGCAG	GGCTAGCTACACGA	GCTGAGCA	TGTTAGC	G GTGCTGCA
2047	AGTTGAGC	GGCTAGCTACACGA	AGCTGAAA	TTGAGGCT	G GCTCAACT

Table 16

2052	CTCTAGT	GGCTAGCTACACGA	TAGACGG	CGTGCCTCA	A	ACTAGAG
2055	CGCTCTGT	GGCTAGCTACACGA	AGTGTAGC	GGCTGACT	A	ACAGAGGC
2059	GGCCGCG	GGCTAGCTACACGA	TGTTAGTT	AACTACGA	G	CGCGGGCC
2063	CGCCGCG	GGCTAGCTACACGA	CGCTCTGT	ACGAGCG	G	CGCGGGCG
2065	GGCCGCG	GGCTAGCTACACGA	CGCTCTGT	GAGCGAGC	G	CGCGGGCG
2068	GGCGGCG	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2070	GGCGGCG	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2076	AGAGGCG	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2085	ACGAGGC	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2093	CGAGGCG	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2095	GGCCGCG	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2100	GTCAGGC	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2106	GATATCT	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2109	GTGATAT	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2111	CTGTGAT	GGCTAGCTACACGA	ATGCTCA	GGCGGCG	G	CGCGGGCG
2115	GGCTCTGT	GGCTAGCTACACGA	CGATATGC	GGCGGCG	G	CGCGGGCG
2120	GGCGGCG	GGCTAGCTACACGA	CGCTGTGA	GGCGGCG	G	CGCGGGCG
2125	AGGTGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2127	GAAGTGC	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2129	ACGAGGT	GGCTAGCTACACGA	CGCGGCG	GGCGGCG	G	CGCGGGCG
2135	CGAGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2137	CGAGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2140	CGAGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2142	CGAGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2144	GGCGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2150	TCCTGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2157	CGCGGCG	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2161	CAGCGGC	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG
2164	GCTGAGC	GGCTAGCTACACGA	CGAGGCG	GGCGGCG	G	CGCGGGCG

Table 16

2170	AGTACAGC GGCCTAGCTACAAACGA TCAGGCGG	CCGCTCTG G GCTGTACT
2173	CAAGGTAC GGTAGTACTACAAACGA AGCTCAGG	CTTGAGCT G GTACTTTG
2175	GACCAAGT GGTCTAGCTACAAACGA ACAGCTCA	TGAGCTTT A ACTTTTTC
2180	ACCTTGAC GGTCTAGCTACAAACGA AAGGTACA	TGTACTTT G GTCAAGGT
2186	ACATCCAC GGTCTAGCTACAAACGA CTTGACAA	TTGTCAAG G GTGTGAT
2190	CGTCAATC GGTCTAGCTACAAACGA CCACTTGG	CAAGTTGG A ATGTGAT
2192	CCGCTCAC GGTCTAGCTACAAACGA ATCACTCT	AGTTGAT G GTACAGGG
2195	GCGCCCGT GGTCTAGCTACAAACGA CACATCCA	TGGAATGG A ACGGGGCG
2199	GTACAGGC GGTCTAGCTACAAACGA CCGTCAAC	TGTACAGG G GCGGTATC
2201	TCGTACGC GGTCTAGCTACAAACGA GCCGTACA	TGAGGGGC G GCGTTACGA
2205	GATGTTGT GGTCTAGCTACAAACGA AGCGGCC	ACGGGGCG G GTACAGCA
2208	GATGGTGT GGTCTAGCTACAAACGA CGTACGGG	GGCGCGGT A ACGACAC
2210	GGGATGGT GGTCTAGCTACAAACGA GTCTGACG	CGCTACGG A AGACATTC
2213	TGGGGGAT GGTCTAGCTACAAACGA GGTGTGGT	CGTACGAC A ACCCTCC
2223	GAGCTGTG GGTCTAGCTACAAACGA CTTGGGGG	ACGACACC A ATCCCGA
2227	CGGTGAGC GGTCTAGCTACAAACGA CTTCTCTG	CCCTCAGG A ACAGCTTC
2231	ACCTCGGT GGTCTAGCTACAAACGA GAGCTGTG	CAGGACAG G GCTCAGGG
2237	GCGATGAC GGTCTAGCTACAAACGA CTCGTGGA	ACAGCTTC A ACGGAGGT
2240	CTGGCGAT GGTCTAGCTACAAACGA GACCTCCG	TGAGGAG G GTCACTGG
2243	ATGCTGGC GGTCTAGCTACAAACGA GATGACCT	CGGAGTTC A ATCGGCGG
2247	GATGATGC GGTCTAGCTACAAACGA TGGGATTT	AGGTCAATC G CCGAGCAT
2249	TTGATGAT GGTCTAGCTACAAACGA GTTGGCGA	CATCGCA G GCATCATC
2252	GGTTTGAT GGTCTAGCTACAAACGA GATGCTGG	TGGCAGC A ATCATCA
2257	TCTGGGGT GGTCTAGCTACAAACGA TTGATGAT	CCAGCATC A ATCAATCC
2265	GTACGTGT GGTCTAGCTACAAACGA TTTGGGGT	ATCATCA A ACCCGAG
2267	CAGTACGT GGTCTAGCTACAAACGA GTTCTGGG	ACCCGAGA A ACAGTAC
2269	CGGATAC GGTCTAGCTACAAACGA GTTTCTTG	CCGAGAAC A ACGTACT
2271	ACGCGAT GGTCTAGCTACAAACGA AGCTGTTT	CAGAAC G GTACTGGG
2274	ACGACGC GGTCTAGCTACAAACGA AGTATGTG	GACACGT A ACTGCGT
2276	CGACGCAC GGTCTAGCTACAAACGA GCAGTACG	CACTACT G GCGTGGT
		CGTACTGC G GTGCGTGG

Table 16

2278	ACCAGGC GCGTAGCTACACGA ACCAGTA	TACTCGT G GCGTCGT
2280	ATACCGAC GCGTAGCTACACGA GACGGAG	CTGCGTGC G GTCGTAT
2284	CGGATAC GCGTAGCTACACGA CGAGCAC	GTGCGTGC G GTATGCG
2286	CACGGCAT GCGTAGCTACACGA ACCAGCC	GCGTCGT A ATGCGTG
2288	ACCAGGC GCGTAGCTACACGA ATACCGAC	GTCGTAT G GCGTGT
2291	TGACACAC GCGTAGCTACACGA GCGATACC	GGTATGCC G GTGCTCA
2294	TCTCGAC GCGTAGCTACACGA CACGGCAT	ATCCGTG G GTCCAGA
2303	TGCGGCG GCGTAGCTACACGA CTCTCGA	TCGABAG G GCGGCCA
2306	CACTGGC GCGTAGCTACACGA GCGCTTCT	AGAGGCC G GCGCATGG
2310	GTGCCAT GCGTAGCTACACGA GCGCGGC	GGCGGCC A ATGGGAC
2314	GACGTGC GCGTAGCTACACGA CCGCATGG	GGCCATGG G GCGGTCC
2316	GCGACGT GCGTAGCTACACGA GCGTCAT	CCATGGC A AGTTCGC
2318	TTGCGAC GCGTAGCTACACGA GTGCTCAT	ATGGCAC G GTCCGAA
2322	GGCTTGC GCGTAGCTACACGA GACGTGC	GCAGTCC G GCGAGCC
2327	TTGAGGC GCGTAGCTACACGA CTTCGGA	TCGCAAG G GCGTCA
2337	GACGTGC GCGTAGCTACACGA TCTTGAG	CTTCAAG G GCGACGTC
2340	AGAGACGT GCGTAGCTACACGA GCGTCTG	CAAGGCG A AGCTCT
2342	GTAGACAC GCGTAGCTACACGA GTGCTCT	AGAGCAC G GCTCTAC
2348	GTACAGT GCGTAGCTACACGA AGAGACGT	AGCTCTCT A ACCTTGC
2354	AGGTCTGT GCGTAGCTACACGA CAGGTAG	CTTACTTG A AGAGACT
2358	CTGAGGT GCGTAGCTACACGA CTGTCAAG	CTTGACAG A ACCTCAG
2358	TGTACGCG GCGTAGCTACACGA TCGAGTTC	GACCTCA G GCGGTAC
2368	GCATGTAC GCGTAGCTACACGA ACCTGAG	CTCGAGC G GTACATG
2370	TGCGATGT GCGTAGCTACACGA GCGCTGG	CCAGCGT A ACTGCGA
2372	TGTGCGAT GCGTAGCTACACGA GTACGGCT	AGCGTAC A ATGCGCA
2374	ACTTCGC GCGTAGCTACACGA ATGTACGG	CCGTACT G GCGACGT
2377	CGAACTGT GCGTAGCTACACGA CGCATGTA	TACTTGG A ACGTTGG
2380	CCAGCAC GCGTAGCTACACGA TGTGGCAT	ATGCGCA G GTTCGTGG
2384	TGAGCCAC GCGTAGCTACACGA GAATCTTC	GACAGTTC G GTGCTCA
2387	AGGTGAGC GCGTAGCTACACGA CACGACT	AGTTCGTC G GCTCAGCT
2391	CTGCGGT GCGTAGCTACACGA GAGCCAG	GCTGGCT A ACCTGAC

Table 16

2395	TCTCTGC GCTAGCTACACGA AGGTGAC	GCTCAGCT G GCGAGGA
2402	GGCTGGT GCTAGCTACACGA CTCTTCA	TGCAGGAG A ACCAGCC
2406	CAGCGGC GCTAGCTACACGA TGGTCTC	GGAGACA G GCGCGCT
2410	CCCTCAG GCTAGCTACACGA GGGCTGT	ACAGGCC G GCTGAGG
2418	GACGGCAT GCTAGCTACACGA CCTTCAG	GCTGAGG A ATCCGCTC
2420	ACGAGGC GCTAGCTACACGA ATCGCTCA	TGAGGAT G GCGCTTGT
2423	ATGACGAC GCTAGCTACACGA GGCATGCC	GGATGCC G GTCTGTAT
2426	TGATGAG GCTAGCTACACGA GAGGCAT	ATCGCTC G GTACGGA
2429	TGCTGAT GCTAGCTACACGA GAGGACG	CGTGTTC A ATCGAGA
2434	ABCTTGC GCTAGCTACACGA TGGATGAC	GTATGGA G GCGAGCT
2439	GGAGGAC GCTAGCTACACGA TCTGCTCG	CGAGAGA G GCTCTCTC
2451	GCTCTAT GCTAGCTACACGA TGGGGAG	CTCCCTGA A ATGAGGCC
2456	CTGCTGC GCTAGCTACACGA CTATTTCA	TGATGAG G GCGAGAG
2460	GCTCTGC GCTAGCTACACGA TGCCCTCA	TGAGGCA G GCGATGCC
2463	GAGCGAC GCTAGCTACACGA TGCCTGC	GGCGACA G GTGGCTC
2466	GAGAGGC GCTAGCTACACGA CACTCTG	CAGCATG G GCTCTTC
2475	GAGAGCT GCTAGCTACACGA GCGAGAG	CCTCTCG A ACCTTCT
2477	AGGAGAC GCTAGCTACACGA GTCGAGA	TCTTGAC G GTCTTCT
2485	TGAGCGT GCTAGCTACACGA AGGAGAC	GTCTTCT A AGCTTCA
2487	CATGAGC GCTAGCTACACGA GTAGGAG	CTTCTTAC G GCTTATG
2492	TGGCATAT GCTAGCTACACGA GAGGCTA	TACGCTTC A ATGTCCA
2494	GTGGCAC GCTAGCTACACGA ATGAGCG	CGCTTAT G GTGCGAC
2496	GTGGTGC GCTAGCTACACGA ACATGAG	CTTCAAT G GCGACGC
2499	GGCTGGT GCTAGCTACACGA GGCATATG	CATGTGC A ACCAGCC
2502	CAGCGCT GCTAGCTACACGA GTTGGAC	GTGCGAC A AGCGCTG
2504	CGCAGGC GCTAGCTACACGA GTTGTGC	GGCAGAC G GCGTGGG
2507	ATGCGAC GCTAGCTACACGA GCGTGGT	ACCGCC G GTGGCAT
2509	TGATGCC GCTAGCTACACGA AGCGGTG	CAGCGCT G GCGCATCA
2511	CCTGATGC GCTAGCTACACGA GCGAGCG	GCGGTGC G GCTATGAG
2513	CCCTGAT GCTAGCTACACGA GCGAGCG	CGGTGCC A ATCAGGG
2520	GGCTTGC GCTAGCTACACGA CCTGATG	CATGAGG G GCAAGTCC

Table 16

2524	CGTAGGAC	GGCTAGCTACACGA	TTGGCCCT	AGGGGAA	G	GTCTTAGG
2529	CTGGAGGT	GGCTAGCTACACGA	AGGACTTG	CAAGTCTT	A	ACGTCCAG
2531	CACTGGAC	GGCTAGCTACACGA	GTAGAGCT	AGTCTTAC	G	GTCCAGTG
2536	CTTGGCAC	GGCTAGCTACACGA	TGGAGTGA	TAGCTTCA	G	GTGCCAAG
2538	CCCTGGCC	GGCTAGCTACACGA	ACTGGATG	GGTCCAGT	G	GGCCAGGG
2546	TGGGGAT	GGCTAGCTACACGA	CCCTGGCC	GCACAGGG	A	ATCCCGCA
2551	AGCCTCTC	GGCTAGCTACACGA	GGATCTCC	GGATCTCC	G	GGAGGGCT
2556	GATGGAG	GGCTAGCTACACGA	CTTGGGGG	CCCGGAGG	G	GCTCCATC
2561	GAAGGAT	GGCTAGCTACACGA	GGAGCCCT	AGGGCTCC	A	ATCTCTTC
2570	AGAGCGT	GGCTAGCTACACGA	GGAGGAGA	TCTCTCTC	A	AGCTGTCT
2572	AGAGCAG	GGCTAGCTACACGA	GTGGAGAG	CTCTCCAC	G	GGCTGTCT
2575	TGAGAGC	GGCTAGCTACACGA	AGGTTGGA	TCCACGCT	G	GGCTCTGA
2580	CAGGCTGC	GGCTAGCTACACGA	AGAGGAGC	GGTGTCTT	G	GGAGCTTG
2583	GCACAGC	GGCTAGCTACACGA	TGCGAGGC	GGTCTGGA	G	GGCTGTGC
2587	CGTAGCAC	GGCTAGCTACACGA	AGGCTGCA	TGCGAGCT	G	GGCTACAG
2589	GGCTAGC	GGCTAGCTACACGA	ACAGGCTG	CAGGCTGT	G	GGCTACGG
2592	GTGGCCGT	GGCTAGCTACACGA	AGCAAGGG	CTGTGTCT	A	ACGGCGAC
2595	CATGTCGC	GGCTAGCTACACGA	GTTAGCAC	GTGCTTAG	G	GGCACTG
2598	CTCCATGT	GGCTAGCTACACGA	CGGCTTAG	CTACGGCG	A	ACATGGAG
2600	TTCTCCAT	GGCTAGCTACACGA	GTGGCCGT	ACGGGAC	A	ATGGAGAA
2607	CACCTTGT	GGCTAGCTACACGA	TCTCCATG	CATGGAGA	A	ACAAAGCTG
2611	CAACAGC	GGCTAGCTACACGA	TGTGTCTC	GGAGACA	G	GCTGTITG
2614	CCGCAAC	GGCTAGCTACACGA	AGCTTGT	ACAAAGCT	G	GTGTGGGG
2618	ATCCCGC	GGCTAGCTACACGA	AAACAGCT	AGCTTTT	G	GGCGGAT
2624	CGCCGAT	GGCTAGCTACACGA	CCCGGAA	TTGGGGGG	A	ATTCGGCG
2629	CGTCCGC	GGCTAGCTACACGA	GGATCTCC	GGGATTCG	G	ACGGGAGG
2634	CAGCCGT	GGCTAGCTACACGA	CCGCGCCA	TGGCGGGG	A	ACGGGCTG
2638	GGAGCAGC	GGCTAGCTACACGA	CGTTCGCG	CGGAGCGG	G	GCTGCTCC
2641	GCAGAGC	GGCTAGCTACACGA	AGCCGCTC	GAGGAGCT	G	GGCTCTGT
2647	CCAAAGC	GGCTAGCTACACGA	AGGAGCAG	CTGCTCTT	G	GGCTTTGG
2649	CAACAAAC	GGCTAGCTACACGA	GCAGAGC	GGTCTCTG	G	GTTTGGTG

Table 16

2654	TCATCCAC	GGCTAGCTACACGA	CAACACGA	TCGCTTTC	G GTGAGTGA
2658	GAATATAT	GGCTAGCTACACGA	CCACGAAA	TTTGCTGG	A ATGATTTTC
2661	CAAGAAAT	GGCTAGCTACACGA	CATCCAC	GGTGGAGT	A ATTTCCTC
2668	TCACCAAC	GGCTAGCTACACGA	AAGAAATC	GAATTCCT	G GTTGCTGA
2672	GGTGTAC	GGCTAGCTACACGA	CAACAAGA	TCCTGTTG	G GTGACAC
2675	TGAGGTGT	GGCTAGCTACACGA	CACCAAGA	TGTTGATG	A ACACCTCA
2677	GGTGAAGT	GGCTAGCTACACGA	GTACACAA	TTGTTGAC	A ACCTCCAC
2682	GGTGAAGT	GGCTAGCTACACGA	GAGGTGTC	GAACCTCT	A ACCTCCAC
2687	GGTGTGGT	GGCTAGCTACACGA	GAGGTGAG	CTACCTTC	A ACCCACGC
2691	TTTGGCGT	GGCTAGCTACACGA	GGTGGAG	CTGACCC	A ACACGAAA
2693	GGTGTGGT	GGCTAGCTACACGA	GTGGGTGA	TCACCCAC	G GCGAATAAC
2699	AGGAAGGT	GGCTAGCTACACGA	TTTGGCGT	AGCGAAA	A ACCTTCCT
2711	ACCAAGGT	GGCTAGCTACACGA	CTGAGGA	TCCTGAGG	A ACCTGGT
2717	CTCTGGAC	GGCTAGCTACACGA	CAGGTGTC	GGACCTTG	G GTCCGAGG
2724	AGGACAC	GGCTAGCTACACGA	CTGGAC	GGTCCGAG	G GTGCTCT
2726	TGAGGAC	GGCTAGCTACACGA	ACCTGGA	TCGAGGT	G GTGCTGA
2734	AGCATAC	GGCTAGCTACACGA	TGAGGAC	GTCCCTGA	G GTATGCT
2736	GMAGCAT	GGCTAGCTACACGA	ACTCAGG	CCCTGAGT	A ATGGCTGC
2739	CAGGAC	GGCTAGCTACACGA	CATCTCA	TGAGTATG	G GTGCTG
2742	CACACGC	GGCTAGCTACACGA	AGCCATAC	GTATGGCT	G GCGTGGT
2744	TTACACAC	GGCTAGCTACACGA	GCAGCAT	ATGGCTGC	G GTGGTGA
2747	AGTTTCAC	GGCTAGCTACACGA	CAGCGAC	GCTGGTGG	G GTGAACTT
2751	CCGCAAGT	GGCTAGCTACACGA	TCACCGG	CGTGGTGA	A ACTTGGG
2755	TCCTCCGC	GGCTAGCTACACGA	AAATTCAC	GTGAACTT	G GCGGAG
2762	ACACTGT	GGCTAGCTACACGA	CTTCCGA	TGCGAAG	A ACAGTGT
2765	TTACACAC	GGCTAGCTACACGA	TGCTTTC	GGAGACA	G GTGGTGA
2768	AAATTCAC	GGCTAGCTACACGA	CATGTCT	AGACAGTG	G GTGAACTT
2772	AGGAAGT	GGCTAGCTACACGA	TACCACT	AGTGGTGA	A ACTTCCCT
2780	TCTTCTAC	GGCTAGCTACACGA	AGGAAGT	ACTTCCCT	G GTAGAGA
2787	GGCTGCT	GGCTAGCTACACGA	CTTCTACA	TGTAGAG	A ACAGGCC
2792	CCACAGGC	GGCTAGCTACACGA	CTGGTCTT	AAGACAG	G GCGCTGAG

Table 16

2799	CGTCCAC GGCCTAGCTACAACGA	CGAGGCC	GGCCCTGG G GTGGACG
2802	AGCCGTGC GGCCTAGCTACAACGA	CACCCAGG	CTGGGTGG G GCAAGGCT
2804	MAACCGTT GGCCTAGCTACAACGA	GCCACCCA	TGGGTGGC A AGCGTTT
2807	ACAAAGC GGCCTAGCTACAACGA	CGTCCAC	GTGGCAGC G GCTTTTGT
2813	ATCTGAAC GGCCTAGCTACAACGA	AAAGCCG	CGCTTGT G GTTCAGT
2819	GCCTGCAT GGCCTAGCTACAACGA	CTGACGA	TTGTTGAG A ATGCGGC
2821	GGCCCGGC GGCCTAGCTACAACGA	ATCTGAAC	GTTCAGT A GCGGGCC
2825	CGTGGGCG GGCCTAGCTACAACGA	CGCATCT	AGATGCG G GCCACGG
2829	TAGGCGGT GGCCTAGCTACAACGA	GGCCGCG	GCCGCCC A ACGGCTA
2832	GAATAGC GGCCTAGCTACAACGA	CGTGGCC	GGCCACG G GCTATTC
2836	AGGGGAT GGCCTAGCTACAACGA	AGCGGTG	CAGGCGCT A ATTCCCT
2845	GGCGGNC GGCCTAGCTACAACGA	CAGGGGA	TTCCCTG G GTGGCGC
2847	CAGCCGCG GGCCTAGCTACAACGA	ACGAGGG	CCCTGGT G GCGGCTG
2850	CAGCAGCG GGCCTAGCTACAACGA	CGCACCAG	CTGGTGG G GCTGCTG
2854	CCAGGAGC GGCCTAGCTACAACGA	AGGCCGCA	TGCGGCT G GCTGCTG
2857	TATCCAGC GGCCTAGCTACAACGA	AGCAGCC	GGCTGCT G GCTGATA
2862	CCGGGTAT GGCCTAGCTACAACGA	CCAGCAG	GTGCTGG A ATACCGG
2864	GTCCGGGT GGCCTAGCTACAACGA	ATCCGCA	TGCTGGAT A ACCCGAC
2870	TCCAGGGT GGCCTAGCTACAACGA	CCGGGTAT	ATACCGG A ACCTGGG
2879	CTCTGCAC GGCCTAGCTACAACGA	CTCCAGGG	CCCTGGAT G GTCCAGAG
2881	GGCTCTGC GGCCTAGCTACAACGA	ACCTCCAG	CTGGAGGT G GCAGAGCG
2886	GTAGTCGC GGCCTAGCTACAACGA	TCTGCACC	GTGTCAGA G GCGACTAC
2889	GGAGTAGT GGCCTAGCTACAACGA	CGCTCTGC	GCAGAGCG A ACTATCC
2892	GCTGGAGT GGCCTAGCTACAACGA	AGTGGCTC	GATCGACT A ACTCGAC
2898	GGATAGC GGCCTAGCTACAACGA	TGGATAG	CTATCCA G GCTATGCC
2901	CCGGGCAT GGCCTAGCTACAACGA	AGCTGGAG	CTCGACT A ATGCCCG
2903	GTCCGGGC GGCCTAGCTACAACGA	ATAGCTGG	CGAGTAT G GCGCGAC
2909	ATGGAGGT GGCCTAGCTACAACGA	CCGGGCAT	ATGCCGG A ACTCCAT
2915	GCTCTGAT GGCCTAGCTACAACGA	GGAGTCC	GGACTCC A ATCAGAG
2921	AGACTGAC GGCCTAGCTACAACGA	TCTGATGG	CCATCAGA G GCGAGTCT
2925	GCTGAGAC GGCCTAGCTACAACGA	TGGCTCTG	CAGAGCCA G GTCTCAC

Table 16

2930	TTGAAGGT GGTAGCTACAAAG GAGACTGG	CCAGTCTC A ACTCTCAA
2937	GCCCGGCT GGTAGCTACAAAG TGAAGTGG	CAGCTTCA A ACCGGCG
2940	GAACTGCT GGTAGCTACAAAG GATTTGAG	CTTCAACG G GGGGCTTC
2943	CTTGAAGC GGTAGCTACAAAG CCGGGTGG	CAACCGCG G GCTTCAAG
2951	CTCCGAGC GGTAGCTACAAAG CTTGAAGC	GCTTCAAG G GCTGGGAG
2961	AGGCATGT GGTAGCTACAAAG TCTCCGCA	TGGGAGGA A AGTGGCT
2963	CGAGCAT GGTAGCTACAAAG GTTCTCC	GGAGGAC A ATGGGTGG
2965	TGGGAGCG GGTAGCTACAAAG ATGTCTCT	AGGAACAT G GGTGCGA
2967	TTTGGGAC GGTAGCTACAAAG GCAATGTC	GAACATGC G GTGCGAAA
2970	GAGTTTGC GGTAGCTACAAAG GACGATG	CATGGCTC G GGAACCTC
2974	CAAGAGAT GGTAGCTACAAAG TTGGGAGC	GCTTGCGA A ACTCTTTG
2984	CGCAGAC GGTAGCTACAAAG CCCAAGA	TCTTTGGG G GTCTTGG
2989	TCAGCCGC GGTAGCTACAAAG AAGACCCC	GGGGTCTT G GGGGCTGA
2992	ACTTCAGC GGTAGCTACAAAG CGCAGAC	GTCTTGGG G GCTGAAT
2998	TGTGAAC GGTAGCTACAAAG TTGAGCG	CGCTGGA G GTGTCACA
3000	GCTGTGAC GGTAGCTACAAAG ACTTCAG	GCTGAAGT G GTCAAGC
3003	CAGCTGT GGTAGCTACAAAG GACACTTC	GAGGTGTC A ACGGCTG
3006	AACAGGC GGTAGCTACAAAG TGTGAAC	GGTTCAGA G GCTCTGTT
3010	CCAGAAC GGTAGCTACAAAG AGGCTGTG	CACAGCTT G GTTCTGG
3018	CTGCAAT GGTAGCTACAAAG CCAGAAC	GTTCCTGG A ATTGGAG
3022	TCACCTGC GGTAGCTACAAAG AAATCAG	CTGGATTT G GAGGTGGA
3026	CTGTTGAC GGTAGCTACAAAG CTGCAAT	ATTGGAG G GTGACAG
3030	GAGCTGT GGTAGCTACAAAG TCACTTGC	GCAAGTGA A ACGGCTC
3033	CTGAGGC GGTAGCTACAAAG TGTTCAC	GGTGACA G GCTTCCAG
3041	CACACCT GGTAGCTACAAAG CTGAGGC	GCTTCAG A ACGGTGTG
3044	GTGACAC GGTAGCTACAAAG CGTCTGGA	TCCAGAG G GTGTGCA
3046	TGGTGAC GGTAGCTACAAAG ACGTCTG	CAGAAGT G GTGACCA
3048	GTGCTGC GGTAGCTACAAAG ACATGTC	GAAGGTGT G GTACACAC
3050	ATGTTGGT GGTAGCTACAAAG GCACCG	CGGTGTC A ACCAATC
3054	GTAGATGT GGTAGCTACAAAG TGGTGAC	GTGCACA A ACATCTAC
3056	TTTGAAT GGTAGCTACAAAG GTTGGTGC	GCACGAC A ACTTACA

Table 16

3060	GATCTGT GCTAGCTACAAG AGATGTG	CACATAT A AAGATTC
3065	AGGAGAT GCTAGCTACAAG CTGTAGA	TCTACAG A ATCTCTCT
3073	CCTGGAG GCTAGCTACAAG AGAGGAT	ATCTCTT G GCTGCGT
3076	AGCCTGC GCTAGCTACAAG AGGAGAG	CTCTCTT G GGAGGCT
3080	CTGTAGC GCTAGCTACAAG CTGACGA	TGCTGCAT G GCTACAG
3082	ACCTGTAC GCTAGCTACAAG GCTGCGG	CTGAGGC G GTACAGT
3084	AAACTCT GCTAGCTACAAG AGCCTGC	GGAGGCT A AAGATTT
3088	CGTGAAC GCTAGCTACAAG CTGTACG	GCTACAG G GTTTCAG
3093	ACATGCT GCTAGCTACAAG GAACTTG	CAGGTTT A AGCAATG
3095	ACATGCT GCTAGCTACAAG GTGAATC	GGTTTTC G GCATGTG
3097	GCACGAT GCTAGCTACAAG GCTGAAA	TTTCAGC A ATGTGTG
3099	CAGCACAC GCTAGCTACAAG ATCTGCA	TCACGAT G GTGTGCT
3101	TGACGAC GCTAGCTACAAG AATCTGT	AGCATGT G GTCTGCA
3103	GCTGAGC GCTAGCTACAAG ACACATG	GCTGTGT G GCTGAGC
3106	GGAGTGC GCTAGCTACAAG AGCACCA	TGCTGCT G GCAGTCC
3109	ATGGAGC GCTAGCTACAAG TCGAGAC	GTGCTGA G GCTGCTT
3115	GATGAAT GCTAGCTACAAG GCGAGCTG	CAGTCCC A ATTGATC
3120	TTCGTGAT GCTAGCTACAAG GAAATGG	CCCATTC A ATCAGAA
3124	AACTTGC GCTAGCTACAAG TGATGAA	TTCTACA G GGAGTTT
3128	TTCAAAAC GCTAGCTACAAG TTGCTGAT	ATCAGAA G GTTGGAA
3138	TGTGGGT GCTAGCTACAAG TCTTCCA	TTGGAGA A ACCTGCA
3143	AAAAATG GCTAGCTACAAG GGGGTTCT	AGAACCC A ACATTTT
3145	GGAAAAAT GCTAGCTACAAG GTGGGTT	AACCCAC A ATTITTC
3154	TGACGCC GCTAGCTACAAG AGGAAAA	TTTTTCT G GCGCTCA
3156	GATGACC GCTAGCTACAAG GGAGAAA	TTTCTGC G GGTGATC
3158	GAGATGAC GCTAGCTACAAG GCGAGGA	TCTGGGC G GTATCTC
3161	TGAGGAT GCTAGCTACAAG GAGGCGA	TGCGCTC A ATCTCTG
3168	GGCCCTGT GCTAGCTACAAG CAGATAT	CATCTG A ACAGGCC
3170	GAGGCTGT GCTAGCTACAAG GTGAGAA	TCTGTAC A ACAGGCTC
3173	AGGAGGC GCTAGCTACAAG GGTGTAG	CTGACAG G GCTCTCT
3183	GGAGTAC GCTAGCTACAAG AGAGGAG	CTCTCTT G GCTACTTC

Table 16

3186	GATGAGT	GGCTAGCTACACGA	AGCAGAG	CCTCTCT A	ACTCCTC
3191	TTACAGAT	GGCTAGCTACACGA	GGAGTAG	GCTACTCC A	ATCCTGAA
3200	TTCTTGGC	GGCTAGCTACACGA	TTTACGA	TCTTGAAA	A
3207	CCTTGCGT	GGCTAGCTACACGA	TCTTGCT	AGCCAGN A	AGCAGGG
3209	ATCCCTGC	GGCTAGCTACACGA	GTTCTTGG	CGAGAAC	G ATGAGAT
3215	AGGACAT	GGCTAGCTACACGA	CCTTGCT	AGCAGGG A	ATTCCTT
3217	ACAGGAC	GGCTAGCTACACGA	ATCCTGC	GCAGGAT G	GTGCTTGG
3220	CCTTGGC	GGCTAGCTACACGA	GACATCC	GGATGTC G	GCTGAGGG
3227	CCTTGGC	GGCTAGCTACACGA	CCCAAGG	CCTTGGG G	GCACAGGG
3234	GGCGGGGC	GGCTAGCTACACGA	CCTTGGC	GGCCAGG G	GGCGGGC
3236	CGGCGGC	GGCTAGCTACACGA	GGCTTGG	CGAGGGC G	GGCGGGC
3239	GGCGGGC	GGCTAGCTACACGA	GGCGGCT	AGCGGGC G	GGCGGGC
3243	CAGAGGC	GGCTAGCTACACGA	CGCGGGC	GGCGGGC G	GGCGGGC
3250	CGAGGGC	GGCTAGCTACACGA	AGAGGGC	GGCGGGC G	GGCGGGC
3260	TGACGGC	GGCTAGCTACACGA	CTCGAGG	CCTCGAG G	GGCGGGC
3263	CAGTGC	GGCTAGCTACACGA	GGCTTGG	CGAGGGC G	GGCGGGC
3265	GGCTGC	GGCTAGCTACACGA	AGGGGCT	GGCGGGC G	GGCGGGC
3268	ACAGGC	GGCTAGCTACACGA	TGCAAGC	GGCGGGC G	GGCGGGC
3271	GGACAGC	GGCTAGCTACACGA	CAGTGC	GGCGGGC G	GGCGGGC
3274	GGTGGC	GGCTAGCTACACGA	AGCGAGC	GGCGGGC G	GGCGGGC
3276	TTGTTGGC	GGCTAGCTACACGA	ACAGGC	GGCGGGC G	GGCGGGC
3279	TGCTTGGT	GGCTAGCTACACGA	GGCAGC	GGCGGGC G	GGCGGGC
3284	AGGAATC	GGCTAGCTACACGA	TTGTTGGC	GGCGGGC G	GGCGGGC
3286	CGAGGAT	GGCTAGCTACACGA	GTTTGGT	GGCGGGC G	GGCGGGC
3292	GCTTGGC	GGCTAGCTACACGA	AGGATGC	GGCGGGC G	GGCGGGC
3298	AGTCAGC	GGCTAGCTACACGA	TTGAGAG	GGCGGGC G	GGCGGGC
3302	TGTCAGT	GGCTAGCTACACGA	CAGCTTGA	GGCGGGC G	GGCGGGC
3307	CAGGTTT	GGCTAGCTACACGA	CGAGTCAG	GGCGGGC G	GGCGGGC
3309	GACAGGT	GGCTAGCTACACGA	GTGAGTC	GGCGGGC G	GGCGGGC
3312	GTTAGAC	GGCTAGCTACACGA	GGTGTGA	GGCGGGC G	GGCGGGC
3314	TAGTGC	GGCTAGCTACACGA	AGGTTTC	GGCGGGC G	GGCGGGC

Table 16

3317	ACGTAGGT	GGCTAGCTACACGA	GACAGGT	ACGGTTC A	ACCTACGT
3321	TGGCAGCT	GGCTAGCTACACGA	AGGTGAC	TGTACCT A	ACGTGCA
3323	ACTGGCAC	GGCTAGCTACACGA	GTAGTGA	TOACTTAC G	GTGGCACT
3325	GGAGTGGC	GGCTAGCTACACGA	GTAGTGT	ACTTAGGT G	GGCACTTC
3328	CCAGGAGT	GGCTAGCTACACGA	GGCAGTA	TAGTGGC A	ACTCTCG
3337	TGAGTGAC	GGCTAGCTACACGA	CCAGGAG	CTCTGGG G	GTCACTCA
3340	TCTGAGT	GGCTAGCTACACGA	GACCCGAG	CTGGGCTC A	ACTCAGAA
3347	TGGGCTGT	GGCTAGCTACACGA	CTGAGTG	CAGTGGG A	ACAGCCCA
3350	GTCTGGAC	GGCTAGCTACACGA	TGTCTGTA	TCAGGACA G	GCCCGAC
3356	AGCTGGGT	GGCTAGCTACACGA	CTGGGCTG	CAGCCGAG A	ACGACGCT
3358	TCAGCTGC	GGCTAGCTACACGA	GTCTGGC	GCCCGAC G	GGAGCTGA
3361	GACTCAGC	GGCTAGCTACACGA	TGGGTCTG	CAGACGCA G	GCTGAGTC
3366	CTTCCGAC	GGCTAGCTACACGA	TGAGCTGC	GGAGCTGA G	GTGCGAAG
3373	CGGGAGC	GGCTAGCTACACGA	TTCGAGCT	AGTCGAAA G	GCTCCCG
3383	AGGTTGTT	GGCTAGCTACACGA	CCCGGGA	TCCCGGG A	ACGAGGCT
3386	GTACAGCT	GGCTAGCTACACGA	CGTCCCG	CGGGAGC A	AGGCTGAC
3388	CAGTCAGC	GGCTAGCTACACGA	GTGTTCC	GGAGCAG G	ACTGACTG
3392	AGGGAGT	GGCTAGCTACACGA	CAGCTGCG	CGAGGCTG A	ACTGCGCT
3395	TCAAGGAC	GGCTAGCTACACGA	AGTCAGC	CGCTGACT G	GGCTGGA
3404	GCTGGGAC	GGCTAGCTACACGA	CTCCAGGG	CCCTGGAG G	GGCGGAGC
3407	TGGCTGAC	GGCTAGCTACACGA	GGCTCCA	TGGAGGCC G	GGAGCCGA
3410	GGTTTGGC	GGCTAGCTACACGA	TGGGAGCT	AGGCCGCA G	GGCAGACC
3414	TGCGGGT	GGCTAGCTACACGA	TGGTGGG	CGAGCCA A	ACCGGGCA
3419	GGCAGTGC	GGCTAGCTACACGA	CGGTTGG	CCAACCG G	GGCTGCC
3421	AGGGAGT	GGCTAGCTACACGA	GGCGGTT	AGCCGGC A	ACTGCGCT
3424	CTGAGGAC	GGCTAGCTACACGA	ACTGCGGG	CGGGGACT G	GGCTGAG
3432	CTTGAGGT	GGCTAGCTACACGA	CTGAGGAC	GGCTGAG A	ACTTCAAG
3440	AGGATGTT	GGCTAGCTACACGA	CTTGAGT	ACTTCAAG A	ACGATCTT
3443	TCCAGGAT	GGCTAGCTACACGA	GGTCTGA	TCAGAGC A	ATGCTGGA
3450	CCATCAGT	GGCTAGCTACACGA	CCAGGATG	CATCTGG A	ACTGATGG
3454	GTGGCAGT	GGCTAGCTACACGA	CAGTCCAG	CTGGAGTG A	ATGGCCAC

Table 16

3457	CGGCTGCG	GGCTAGCTACAACGA	CACTGATC	GGCTGATG	G	GGCCACCG
3460	GGCGGGGT	GGCTAGCTACAACGA	GGCCATCA	TGATGGCC	A	ACCCGCTC
3464	CTGTGGC	GGCTAGCTACAACGA	GGCTGGCC	GGCCACCC	G	GGCCACAC
3468	CTGGCTGT	GGCTAGCTACAACGA	GGCGGGTT	ACCGCTCC	A	ACAGTCAG
3471	GGCTGGC	GGCTAGCTACAACGA	TTGTGGCG	CGCCACCA	G	GGCCAGCC
3476	CTCTGGC	GGCTAGCTACAACGA	TTGTGGCG	ACAGCCAG	G	GGCGAGAG
3483	GTGTCTGC	GGCTAGCTACAACGA	TTCTGGCC	GGCCACGA	G	GGAGACAC
3487	GCTGTGT	GGCTAGCTACAACGA	CTGCTCTC	GGAGGAC	A	ACACAGCC
3489	CTGCTGGT	GGCTAGCTACAACGA	GTCTGCTC	GGAGGAC	A	ACACAGCC
3493	AGGCTGCG	GGCTAGCTACAACGA	TGTTGTCT	AGACACCA	G	GGAGCCCT
3496	GACAGGAC	GGCTAGCTACAACGA	TGTTGTCT	CACACGA	G	GGCTGTCT
3501	GGCTGAC	GGCTAGCTACAACGA	AGGCTTAC	GGAGCCCT	G	GTACAGCC
3504	CCGCGGCT	GGCTAGCTACAACGA	GACAGGAC	GGCTTCTC	A	AGCCCGGG
3506	AGCCCGGC	GGCTAGCTACAACGA	GTGACGCG	CTCTTAC	G	GGCGGGCT
3511	GGTAGAG	GGCTAGCTACAACGA	CCGCGGCT	CACGCGCG	G	GGCTTACG
3516	TGGGACGT	GGCTAGCTACAACGA	AGAGCCCG	CGGCTCTC	A	AGCTTCCA
3518	CTTGAGAC	GGCTAGCTACAACGA	GTAGAGCC	GGCTTAC	G	GTCCGAGG
3535	TGGGCGGC	GGCTAGCTACAACGA	CCCTCCCT	AGGAGGGG	G	GGGAGCCA
3538	GTGTGGC	GGCTAGCTACAACGA	GGCCCTTC	GAGGAGCG	G	GGCCACAC
3542	CTGGTGT	GGCTAGCTACAACGA	GGGCGGCC	GGCGCCCC	A	AGACCCAG
3544	GCTTGGT	GGCTAGCTACAACGA	GTGGGCGG	CGTCCAC	A	ACCCAGGC
3550	GTGCGGCG	GGCTAGCTACAACGA	CTGGTGT	ACACCCAG	G	GGCCGACC
3554	AGCGTGC	GGCTAGCTACAACGA	GGGCTTGG	CAGGCCC	A	GGCCGCTC
3556	CGAGGGT	GGCTAGCTACAACGA	GGGCTT	GGTCCAC	G	GGTGGAG
3559	CTCCGAC	GGCTAGCTACAACGA	GGTGGGAG	CGCTGGGA	G	GTCTGAGG
3566	CTCAGAC	GGCTAGCTACAACGA	TCCAGCG	AGTCTGAG	G	GGCTGAGT
3573	ACTAGGC	GGCTAGCTACAACGA	CTCAGACT	AGGCTCGA	G	GTGGAGTT
3579	ACACTGAC	GGCTAGCTACAACGA	TCAGGCTT	CTGAGTGA	G	GTGTTTGG
3583	CGAAGAC	GGCTAGCTACAACGA	TCAGTCTAG	GAGTGGT	G	GTTTGGCC
3585	GGCCAAC	GGCTAGCTACAACGA	ACTGACTC	AGTGTTCG	G	GGCGAGGC
3590	GGCTGGC	GGCTAGCTACAACGA	CAAGACT			

Table 16

3596	ATGCAGGC	GGCTAGCTACACGA	CTGGGCGA	TGGCCGAG	G	GGCTGCAT
3600	GGACATGC	GGCTAGCTACACGA	AGGCGCTCG	CGAGGCGCT	G	GCATGTCC
3602	CGGAGCAT	GGCTAGCTACACGA	GGGAGGCT	AGGCTGCG	A	ATGTCCGG
3604	AGCGGAGC	GGCTAGCTACACGA	ATGAGGCT	GGCTGCAT	G	GTCCGGCT
3609	CGTTCAGC	GGCTAGCTACACGA	CGGACATG	CAVTCGG	G	GCTGAGGG
3616	CAGTCAGC	GGCTAGCTACACGA	CTTCAGGC	GGCTGAAG	G	GCTGAGTG
3621	CGGAGCAC	GGCTAGCTACACGA	TGAGCTTT	AAAGCTGA	G	GTGTCCGG
3623	AGCGGAGC	GGCTAGCTACACGA	ACTCAGGC	GGCTGAGT	G	GTCCGGCT
3628	GGCTCAGC	GGCTAGCTACACGA	CGGACAT	AGTGTCCG	G	GCTCAGGC
3634	GGCTCAGC	GGCTAGCTACACGA	CTCAGCG	CGGCTGAG	G	GCTCAGGC
3640	ACACTGCG	GGCTAGCTACACGA	TGAGGCTCT	AGGCTGGA	G	GGGAGTGT
3644	CTGGACAC	GGCTAGCTACACGA	TCGCTCAG	CTGAGCGA	G	GTGTCCAG
3646	GGCTGGAC	GGCTAGCTACACGA	ACTCGCTC	GAGTGAGT	G	GTCCAGCC
3651	CCCTTGCG	GGCTAGCTACACGA	TGGACACT	AGTGTGGA	G	GGGAGGG
3658	CAGTCAGC	GGCTAGCTACACGA	CCTTGCGT	AGCCAGAG	G	GCTGAGTG
3663	CTGGACAC	GGCTAGCTACACGA	TGAGGCTCT	AGGCTGGA	G	GTGTCCAG
3665	TGCTGGAC	GGCTAGCTACACGA	ACTCAGGC	GGCTGAGT	G	GTCCAGCA
3670	AGTGTGCG	GGCTAGCTACACGA	TGGACACT	AGTGTGGA	G	GGGAGGG
3674	CGGAGGCT	GGCTAGCTACACGA	GTGCTGGA	TGTCAGC	A	AGGCTGCG
3678	AAAGAGAC	GGCTAGCTACACGA	AGTGTGCG	TCGAGCAC	A	AGCTGCGG
3681	GTGAGAC	GGCTAGCTACACGA	GGGAGTGT	GCACACT	G	GGCTGCTT
3687	GGGAGAGT	GGCTAGCTACACGA	GTGCTGGA	CAGTGGC	G	GTCTTCAC
3695	CAGGCTGT	GGCTAGCTACACGA	GGGAGTGT	CGCTTTC	A	ACTTCCCG
3699	GGGAGAGT	GGCTAGCTACACGA	GTGCTGGA	ACTTCCCG	A	AGGCTGCG
3703	CGGAGGCG	GGCTAGCTACACGA	GGGAGTGT	CGGCTGCG	G	GCTCAGGC
3705	AGGCTGAGC	GGCTAGCTACACGA	GGGAGTGT	AGGCTGCG	G	GCTCAGGC
3710	GGTGGAGC	GGCTAGCTACACGA	GGGAGTGT	CGGCTGCG	G	GCTCAGGC
3715	CCTGGGCT	GGCTAGCTACACGA	GGGAGTGT	CGGCTGCG	G	GCTCAGGC
3723	AAAGCTGCG	GGCTAGCTACACGA	CCTGGGCT	CGGCTGCG	G	GCTCAGGC
3727	GGGAGGCT	GGCTAGCTACACGA	TGGGCTGCG	CGGCTGCG	G	GCTCAGGC

Table 16

3737	CTCTGGT GCTAGCTACACGA GAGAA	TTTCTTC A ACCAGAG
3744	AGCGGGC GCTAGCTACACGA TCTGTGT	CACGAGA G GCTCGGCT
3749	GTGGAGC GCTAGCTACACGA CGGGTCC	GGAGCTCG G GCTTCAC
3755	TGGGGAGT GCTAGCTACACGA GGAACCG	GGGTTCC A ACTCCCA
3762	TCTTATGT GCTAGCTACACGA GGGAGTG	CACCTCCC A ACATAGA
3764	ATTCTAT GCTAGCTACACGA GTGGGAG	CTCCACC A ATAGGAT
3770	TGGACTAT GCTAGCTACACGA TCTTATGT	ACATAGGA A ATAGTCA
3773	GGATGGAC GCTAGCTACACGA TATTCCTA	TAGGAATC G GTCCATCC
3777	CTGGGGAT GCTAGCTACACGA GAACTATT	AAATAGTC A ATCCCGC
3785	TGGCGAAT GCTAGCTACACGA CTGGGGAT	ATCCCGC A ATGGCA
3789	ACATGGC GCTAGCTACACGA GAATCTGG	CCAGATC G GCAATGT
3792	TGAAGAT GCTAGCTACACGA GCGAATC	GAATCGCC A ATGTCTA
3795	GGCTGAC GCTAGCTACACGA AATGCGA	TGCGAAT G GTTCAGC
3799	CGAGGGGT GCTAGCTACACGA GAACATG	CATGTTC A ACCCTCG
3806	GGCAGGCG GCTAGCTACACGA GAGGGGTG	CACCGTCC G GCGCTGC
3811	AGGAGGCG GCTAGCTACACGA AGGGCGAG	CTCGGCT G GCGTCTC
3821	TGGAAGGC GCTAGCTACACGA AAGGAGG	CTCTCTTT G GCTTCCA
3828	GTGGGGGT GCTAGCTACACGA GAGGGTGG	TGCTCTCC A ACCCGAC
3834	TGGATGGT GCTAGCTACACGA GGGGTGG	CCACCCC A ACATCCA
3837	ACCTGGAT GCTAGCTACACGA GAGGAGG	CCCCACC A ATCCAGGT
3843	GTCTCCAC GCTAGCTACACGA CTGGATGG	CCATCCAG G GTGGAGC
3849	CTCAGGGT GCTAGCTACACGA CTCACTT	AGGTGGAG A ACCCTGAG
3861	CCGAGGGT GCTAGCTACACGA CTTTCTCA	TGAGAGG A ACCCTGG
3870	CCGAGGC GCTAGCTACACGA TCCGAGG	CCCTGGGA G GCTCTGG
3879	CTCCAAAT GCTAGCTACACGA TCCAGAG	CTCTGGGA A ATTGGAG
3886	TTGGTAC GCTAGCTACACGA TCCAAAT	AAATTGGA G GTTACGA
3889	CTTTTGGT GCTAGCTACACGA CACTCCAA	TTGGAGTG A ACCAAGG
3896	GGGCAAC GCTAGCTACACGA CTTTGTCT	GACCAAG G GTGTGCC
3898	CAGGGCAC GCTAGCTACACGA ACCTTTGG	CCAAAGT G GTGCCCTG
3900	TACGGGCG GCTAGCTACACGA ACACTTT	AAAGTGT G GCGCTGT
3905	CTGTGTAC GCTAGCTACACGA AGGGCACA	TGTGCCCT G GTACAG

Table 16

3907	GCCTGTGT	GGCTAGCTACACGA	ACAGGGGA		TGCTCTGT A ACAGGGC
3909	TGCTCTGT	GGCTAGCTACACGA	GTACAGGG		CCCTGTAC A ACAGGGC
3913	GTCTGCG	GGCTAGCTACACGA	CTGTGTAC		GTACAGG G GCGAGGAC
3919	TGAGGGT	GGCTAGCTACACGA	CTGTGCT		AGGCGAGG A ACCCTGCA
3924	CCAGGTGC	GGCTAGCTACACGA	AGGTGCT		AGGACCTT G GCACCTGG
3926	ATCCAGT	GGCTAGCTACACGA	GAAGGTG		GACCTTGA A ATGGGGGT
3932	ACCCCAT	GGCTAGCTACACGA	CAGGTGAC		GGATGGGG G GTCTCTGT
3938	ACAGGGAC	GGCTAGCTACACGA	CCCATTC		GCTTCCCT G GTGGGTCA
3944	TGACCGAC	GGCTAGCTACACGA	AGGAGCC		CCCTGTGG G GTCAAAAT
3948	AATTTGAC	GGCTAGCTACACGA	CCAGGGG		TGGGTCAA A ATGGGGG
3953	CCCCCAT	GGCTAGCTACACGA	TTGACCCA		GGGCGGAG G GTCTGTG
3964	CACAGAC	GGCTAGCTACACGA	CTCCCCC		GGGAGGTT G GTCTGTGG
3966	CCACAGC	GGCTAGCTACACGA	ACCTCCC		GAGTCTT G GTGGAGTT
3969	ACTCCAC	GGCTAGCTACACGA	AGCACCTC		CTGTGGGA G GTAAATA
3975	TATTTTAC	GGCTAGCTACACGA	TCCACAG		GCGTAAA A ATACTGAA
3980	TTGATAT	GGCTAGCTACACGA	TTTACTTC		AGTAAAT A ACTGAATA
3982	TATTCAT	GGCTAGCTACACGA	ATTTTACT		AATACTGA A ATATATGA
3987	TCATATAT	GGCTAGCTACACGA	TCAGTATT		TACTGAAT A ATATGATT
3989	ACTCATAT	GGCTAGCTACACGA	ATTCAGTA		CTGAATAT A ATGAGTTT
3991	AAACTCAT	GGCTAGCTACACGA	ATATTGAG		ATATATGA G GTTTTCA
3995	TGAAMAC	GGCTAGCTACACGA	TCATATAT		GTTTTCA G GTTTTGA
4003	TTCAAAAC	GGCTAGCTACACGA	TGAAAAC		

Seq1 = TERT (Homo sapiens telomerase reverse transcriptase (TERT) mRNA, 4015 bp); Nakamura et al., Science 277 (5328), 955-959 (1997)
 Ctl Site = R-Y (Purine/Pyrimidine)

Stem Length = 8 Core Sequence = GCCTAGCTACACGA

343
Table 17

Table 17: Anti-TERT HH and G-Cleaver Ribozymes

Alias	Ribozyme Sequence	Length (nt)
HH		
TERT-1051	AGGAGUA CUGAUGAGGCCGUAAGGCCGAA AGGAAGU	36
TERT-1053	UGAGGAG CUGAUGAGGCCGUAAGGCCGAA AGAGGAA	36
TERT-1918	UGAAGCG CUGAUGAGGCCGUAAGGCCGAA AGUCUGG	36
TERT-2383	GAGCCAC CUGAUGAGGCCGUAAGGCCGAA AACUGUC	36
TERT-2485	UGAAGCG CUGAUGAGGCCGUAAGGCCGAA AGGAAGA	36
TERT-2566	GCGUGGA CUGAUGAGGCCGUAAGGCCGAA AGGAUGG	36
TERT-3181	AGUAGCA CUGAUGAGGCCGUAAGGCCGAA AGGAGG	36
TERT-3691	CUGUGGG CUGAUGAGGCCGUAAGGCCGAA AAGUGAA	36
TERT-3758	AUGUGGG CUGAUGAGGCCGUAAGGCCGAA AGUGGAA	36
TERT-3794	GGUGAAC CUGAUGAGGCCGUAAGGCCGAA AUGGCGA	36
G-Cleaver		
TERT-757	UUGGG UGAUGGCAUGCACUAUGCGCG AACGGCAGAC	36
TERT-2353	UCUGU UGAUGGCAUGCACUAUGCGCG AAGGUAGAGA	36
TERT-3795	GUGAA UGAUGGCAUGCACUAUGCGCG AAUGGCGAAU	36

Table 18

Table 18: Human BACE Hammerhead Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
9	CCACGCGU C CGCAGCCC	1	GGGCGUGG CUGAUGAG X CGAA ACGCGUGG	1776
47	AGCUGGAGU U AUGGUGGC	2	GCCACCAU CUGAUGAG X CGAA AUCCAGCU	1777
48	CGUGGAGU A UGGUGGCC	3	GGCCACCA CUGAUGAG X CGAA AAUCCAGC	1778
93	GGAGCCCU U GCCCGUGC	4	GCAGGGGC CUGAUGAG X CGAA AGGGCUCC	1779
163	CGGCCCCU C CCAGCCCC	5	GGGCGUGG CUGAUGAG X CGAA AGGGCGCG	1780
221	GCCGAGU A GCGGCGUC	6	GAGCCCGC CUGAUGAG X CGAA ACAUCGGC	1781
229	AGCGGGCU C CGGAUCCC	7	GGGAUCCG CUGAUGAG X CGAA AGCCCGCU	1782
235	CUCGCGAU C CCAGCCUC	8	GAGCGUGG CUGAUGAG X CGAA AUCCGGAG	1783
243	CCCAGCCU C UCCCGUGC	9	GCAGGGGA CUGAUGAG X CGAA AGGCGUGG	1784
245	CAGCCUCU C CCUCUGUC	10	GAGCAGGG CUGAUGAG X CGAA AGAGGUGC	1785
253	CCCCGUCU C CGGUGGUC	11	GAGCAGGG CUGAUGAG X CGAA AGCAGGGG	1786
261	CCCGUGCU C UGGGGUUC	12	GAUCCGCA CUGAUGAG X CGAA AGCAGGGG	1787
269	CUGGCGAU C UCCCGUGA	13	UACGGGGA CUGAUGAG X CGAA AUCCGGAG	1788
271	GCGGAGCU C CCGUGACC	14	GGUCAGGG CUGAUGAG X CGAA AGAUCCGC	1789
283	UGACCCGU C UCCACAGC	15	GCUGUGGA CUGAUGAG X CGAA AGCGGUCA	1790
285	ACCGCCUC C CACAGCCC	16	GGGCGUGG CUGAUGAG X CGAA AGGCGGCU	1791
334	CCUGGCGU C CUGAUGCC	17	GGCAUCCG CUGAUGAG X CGAA AGCCAGGG	1792
351	CCCAAGCU C CCUCUCCU	18	AGGAGAGG CUGAUGAG X CGAA AUCCGGAG	1793
355	ACCUCGCCU C UCCUGAGA	19	UCUCAGGA CUGAUGAG X CGAA AGGGAGCU	1794
357	CUCCUCUC C CUGAGAAG	20	CUUCUCAG CUGAUGAG X CGAA AGAGGGAG	1795
386	CCAGAGU U GGGGGCAG	21	CUGCCGCC CUGAUGAG X CGAA AGUCUGGG	1796
477	CCUCGCGU C CUGGUGUG	22	CACAGCAG CUGAUGAG X CGAA AGCCAGGG	1797
531	CACGGCAU C CGGUGGCC	23	GGCAGCCG CUGAUGAG X CGAA AUCCGGAG	1798
632	GGGCGAGU U UGUGGAGA	24	UCUCCACA CUGAUGAG X CGAA AGCUGCCC	1799
633	GGCAGCUU U GUGGAGAU	25	AUUCUCC CUGAUGAG X CGAA AGCUGCCC	1800
665	GGGCAAGU C GGGGACAG	26	CCUGCCCC CUGAUGAG X CGAA ACUGUCCC	1801
677	GCAAGGCU A CUAGGUGG	27	CCACGUAG CUGAUGAG X CGAA AGCCCGGC	1802
680	GGGCUACU A CGUGGAGA	28	UCUCCACG CUGAUGAG X CGAA AGUAGCCC	1803
717	CAGACGCU C AACAUCCU	29	AGGAUGU CUGAUGAG X CGAA AGGCUUUG	1804
723	CUCAACAU C CUGUGGGA	30	UCCACCA CUGAUGAG X CGAA AUGUUGAG	1805
733	UGGUGGAGU A CAGCAGCC	31	GCUGCCUG CUGAUGAG X CGAA AUCCACCA	1806
745	GCAGCAGU A ACUUGUCA	32	UGCAAAGU CUGAUGAG X CGAA ACUGGUGC	1807
749	CAGUAAAU U UGCAUGGG	33	CCACUGCA CUGAUGAG X CGAA AGUUAUCG	1808
750	AGUAAACU U GCAGUGGG	34	CCCAUGG CUGAUGAG X CGAA AGUUAUCU	1809
776	CCACCCCU U CCUGCAUC	35	GAUGCAGG CUGAUGAG X CGAA AGGGGUGG	1810
777	CACCCCUU C CUGCAUGC	36	CGAUGCAG CUGAUGAG X CGAA AUGGGUGG	1811
784	UCCUGCAU C CCUACUAC	37	GUAGUAGC CUGAUGAG X CGAA AUGCAGGA	1812
788	GCAUCCCU A CUACAGGA	38	UCUGUAG CUGAUGAG X CGAA AGCGAUGC	1813
791	UCGCUACU A CCAAGGCG	39	GCCUCUGG CUGAUGAG X CGAA AGUAGCGA	1814
806	GCAGCUGU C CAGCACAU	40	AUGUCUGG CUGAUGAG X CGAA ACAGCUGC	1815
815	CAGCACAU A CCGGACCC	41	GGUCCCGG CUGAUGAG X CGAA AUGGUGUG	1816
825	CGGGACCU C CGGAAGGG	42	CCUUCUCC CUGAUGAG X CGAA AGGUCUCC	1817
839	GGGUGUGU A UGUGCCCU	43	AGGGCACA CUGAUGAG X CGAA ACACACCC	1818
848	UGUGCCCU A CACCCAGG	44	CCUGGUGG CUGAUGAG X CGAA AGGGCACA	1819
891	GACUUGGU A AGCAUCCC	45	GGGAUCCU CUGAUGAG X CGAA ACCAGGUG	1820
897	GUAAAGAU C CCCCAGGG	46	CCAUGGGG CUGAUGAG X CGAA AUGCUUAC	1821
915	CCCAACGU C ACUGUGCG	47	CGCACAGU CUGAUGAG X CGAA ACUGUGGG	1822

Table 18

933	GCCAAACAU	U	GCUGCCAU	48	AUGGCAGC	CUGAUGAG	X	CGAA	AUGUUGGC	1823
942	GCUGCCAU	C	ACUGAUC	49	GAUUCAGU	CUGAUGAG	X	CGAA	AUGGCAGC	1824
950	CACUGAAU	C	AGACAAGU	50	ACUUGUCU	CUGAUGAG	X	CGAA	AUUCAGUG	1825
959	AGACAAGU	U	CUUCAUCA	51	UGAUGAAG	CUGAUGAG	X	CGAA	ACUUGUCU	1826
960	GACAAGUU	C	UUAUCAAA	52	UUGAUGAA	CUGAUGAG	X	CGAA	AACUUGUC	1827
962	CAGUUGUU	U	CAUCAACG	53	CGUUGAUG	CUGAUGAG	X	CGAA	AGAAUUG	1828
963	AAGUUCUU	C	AUCAACGG	54	CCGUUGAU	CUGAUGAG	X	CGAA	AAGAUCUU	1829
966	UUCUUCAU	C	AACGGCUC	55	GAGCCGUU	CUGAUGAG	X	CGAA	AUGAAGAA	1830
974	CAACGGCU	C	CAUCUGGG	56	CCCAGUUG	CUGAUGAG	X	CGAA	AGCCGUUG	1831
990	GAGGCAU	C	CUGGGGCU	57	AGCCCCAG	CUGAUGAG	X	CGAA	AUGCCUUC	1832
1004	GCUGGCCU	A	UGCUGAGA	58	UCUCAACA	CUGAUGAG	X	CGAA	AGGCCAGC	1833
1014	GCUGAGAU	U	GCCAGGCC	59	GGCCUUGC	CUGAUGAG	X	CGAA	AUCUACGC	1834
1031	UGACGACU	C	CCUGGAGC	60	GCUCCAGG	CUGAUGAG	X	CGAA	AGUCGUC	1835
1042	UGGAGCCU	U	UCUUUGAC	61	GUCAAAGA	CUGAUGAG	X	CGAA	AGGCUCCA	1836
1043	GAGGCAU	C	CUGGGGCU	62	AGUCAAGG	CUGAUGAG	X	CGAA	AAGGCUCC	1837
1044	GAGCCUUC	C	UUUGACUC	63	GAGUCAA	CUGAUGAG	X	CGAA	AAGGCUCC	1838
1046	GCCUUCUU	U	UGACUCUC	64	GAGAGUCA	CUGAUGAG	X	CGAA	AGAAAGGC	1839
1047	CCUUCUUU	U	GACUUCUC	65	AGAGAGUC	CUGAUGAG	X	CGAA	AAGAAAGG	1840
1052	CUUUGACU	C	UCUGGUAA	66	UUACCAAG	CUGAUGAG	X	CGAA	AGUCAAG	1841
1054	UGACUCUU	U	CUUGUAA	67	CUUUAACA	CUGAUGAG	X	CGAA	AGAGUCAA	1842
1059	UCUCUGUU	A	AAGCAAGC	68	GUCUGCUU	CUGAUGAG	X	CGAA	ACGAGAGA	1843
1074	ACCCACGU	U	CCCAACCU	69	AGGUUGGG	CUGAUGAG	X	CGAA	ACUUGGUU	1844
1075	CCCAACGU	C	CCAACCU	70	GAGGUUGG	CUGAUGAG	X	CGAA	AACUGUGG	1845
1083	CCCAACCU	C	UUUCUCCU	71	AGGGAAGA	CUGAUGAG	X	CGAA	AGGUUGGG	1846
1085	CAACCCGU	U	UCCUUGGC	72	GCAGGGAG	CUGAUGAG	X	CGAA	AGAGGUUG	1847
1086	AACCUUCU	C	UCCUGUCA	73	UGCAGGGA	CUGAUGAG	X	CGAA	AAGAGUUU	1848
1088	CCUCUUCU	C	CCUGCAGC	74	GCUGCAGG	CUGAUGAG	X	CGAA	AGAAAGG	1849
1098	CUGCAGCU	U	UGUGGGUC	75	GCACCACA	CUGAUGAG	X	CGAA	AGCUGCAO	1850
1099	UGCAGCUU	U	GUGGUGCU	76	AGCACACC	CUGAUGAG	X	CGAA	AAGCUGCA	1851
1112	UGCUGGCCU	U	CCCCUCCA	77	UGAGGGGG	CUGAUGAG	X	CGAA	AGCCAGCA	1852
1113	GCUGGCCU	C	CCCCUCAA	78	UUGAGGGG	CUGAUGAG	X	CGAA	AAGCCAGC	1853
1119	UUCCCCCU	C	AACCAAGC	79	GACUUGUU	CUGAUGAG	X	CGAA	AGGCGAAA	1854
1127	CAACCAAGU	U	UGAAGUGC	80	GCACUCCA	CUGAUGAG	X	CGAA	ACUGGUUG	1855
1142	GCUGGCCU	C	UGUCGGAG	81	CUCCGACA	CUGAUGAG	X	CGAA	AGGCCAGC	1856
1146	GCCUCUGU	C	GGAGGGAG	82	CUCCUCCU	CUGAUGAG	X	CGAA	ACAGAGGC	1857
1161	AGCAUGAU	C	AUUGGAGG	83	CCUCCAAU	CUGAUGAG	X	CGAA	AUACAUCU	1858
1164	AUGAUCAU	U	GGAGGUAA	84	AUACUCCU	CUGAUGAG	X	CGAA	AUGAUCAU	1859
1171	UUGGAGGU	A	UCGACCAC	85	GUGGUGCA	CUGAUGAG	X	CGAA	ACCUCCAA	1860
1173	GAGGGAU	C	GACCAUCC	86	GAGUGGUC	CUGAUGAG	X	CGAA	AUACUCCU	1861
1181	CGACCAU	C	GCUGUACA	87	UGUACAGC	CUGAUGAG	X	CGAA	AGUGGUGG	1862
1187	CUCGUGU	A	CACAGGCA	88	UGCCUGUG	CUGAUGAG	X	CGAA	ACAGCGAG	1863
1198	CAGGCGU	C	UCUGGUUU	89	AUACCGA	CUGAUGAG	X	CGAA	ACUGCCUG	1864
1200	GGCAUCU	C	UGGUUAUC	90	GUUAACCA	CUGAUGAG	X	CGAA	AGACUGCC	1865
1205	UCUCUGUU	A	UACACCCA	91	UGGGUGUA	CUGAUGAG	X	CGAA	ACCAAGAGA	1866
1207	UCUGGUUU	A	CACCCAU	92	GAUGGGUG	CUGAUGAG	X	CGAA	AUACCGA	1867
1215	ACACCCAU	C	CGGCGGGA	93	UCCGCGCG	CUGAUGAG	X	CGAA	AUGGGUGU	1868
1229	GGAGUGGU	A	UUUUGAGG	94	CCUCAUAA	CUGAUGAG	X	CGAA	ACCAUCCU	1869
1231	AGUGGUUU	U	AUGAGGUG	95	CACCUCAU	CUGAUGAG	X	CGAA	AUACCAU	1870
1232	GUGGUUUU	A	UGAGGUGA	96	UCACCUCA	CUGAUGAG	X	CGAA	AUACCAU	1871
1242	GAGGUAU	C	AUUGGUGG	97	CGCAAAU	CUGAUGAG	X	CGAA	AUACCUCC	1872
1245	GUGAUCUU	U	GUGCGGGU	98	ACCCGCAC	CUGAUGAG	X	CGAA	AUGAUCAC	1873

Table 18

1260	GUGGAGAU	C	AAUGGACA	99	UGUCCAUU	CUGAUGAG	X	CGAA	AUCUCCAC	1874
1273	GACAGGAU	C	UGAAAUUG	100	CAUUTUCA	CUGAUGAG	X	CGAA	AUCCUUGC	1875
1295	CNAGGAGU	A	CAACUAGU	101	CAUAGUUG	CUGAUGAG	X	CGAA	ACUCCUUG	1876
1301	GUACAACU	A	UGACAAGA	102	UCUUGUCA	CUGAUGAG	X	CGAA	AGUUGUAC	1877
1314	AAGAGCAU	U	GUGGACAG	103	CUGUCCAC	CUGAUGAG	X	CGAA	AUGCUCUU	1878
1338	ACCAACCU	U	CGUUGUCC	104	GGCAACAG	CUGAUGAG	X	CGAA	AGGUUGGU	1879
1339	CCAACCCU	C	GUTUCCCC	105	GGCAAAAC	CUGAUGAG	X	CGAA	AGGUUGGU	1880
1342	ACCUUCGU	U	UGCCCAAG	106	CUUGGGCA	CUGAUGAG	X	CGAA	ACGAAGGU	1881
1343	CCUUUGUU	U	GCCCAAGA	107	UCUUGGGC	CUGAUGAG	X	CGAA	AAAGAAAG	1882
1358	GAAAGUUG	U	UGAAGCUG	108	CAGCTUCA	CUGAUGAG	X	CGAA	ACACUUUC	1883
1359	AAAGUGUU	U	GAAGCUGC	109	GCAGCUUC	CUGAUGAG	X	CGAA	AAACUUUU	1884
1371	CGUGAGCU	C	AAAUCCAU	110	AUGGAUUU	CUGAUGAG	X	CGAA	ACUGCAGC	1885
1376	AGUCAAAU	C	CAUCAAGG	111	CCUGAUGU	CUGAUGAG	X	CGAA	AUUUGAUC	1886
1380	AAAUCCAU	C	AAGGCAGC	112	GCUGCCUU	CUGAUGAG	X	CGAA	AUGGAUUU	1887
1391	GGCAGCCU	C	CUCCACGG	113	CCGUGGAG	CUGAUGAG	X	CGAA	AGGCUGCC	1888
1394	AGCCUCCU	C	CAGCGAGA	114	UCUCCGUG	CUGAUGAG	X	CGAA	AGGAGGCU	1889
1406	GGAGAAGU	U	CCCUAGUJ	115	CAUCAGGG	CUGAUGAG	X	CGAA	ACUUUCUC	1890
1407	GAGAAGUU	C	CCUGAUGG	116	CCAUCAGG	CUGAUGAG	X	CGAA	AAUCUCUC	1891
1417	CUGAUGUU	U	UCUGGCUA	117	UAGCCAGA	CUGAUGAG	X	CGAA	ACCAUACG	1892
1418	UGAUGUUU	U	UCUGGCUAG	118	CUAGCCAG	CUGAUGAG	X	CGAA	ACACUACA	1893
1419	GAUGGUUU	C	UGGCUAGG	119	CCUAGCCA	CUGAUGAG	X	CGAA	AAACCAUC	1894
1425	UUUCUGCU	C	GAAGGACA	120	UGUCUCCU	CUGAUGAG	X	CGAA	AGCCAGAA	1895
1465	CCACCCCU	U	GGAAACUU	121	AAUGUUUC	CUGAUGAG	X	CGAA	AGGUGUGG	1896
1473	UGGAAACU	U	UJCCACAGU	122	ACUGGGAA	CUGAUGAG	X	CGAA	AUGUJCCA	1897
1474	GGAAACUU	U	UJCCACAGU	123	GACUGGAG	CUGAUGAG	X	CGAA	AAUGUJCC	1898
1475	GAACAUUU	U	CCAGUCAU	124	UGACUGGG	CUGAUGAG	X	CGAA	AAAUJGUC	1899
1476	AAACAUUU	C	CCAGUCAU	125	AUGACUGG	CUGAUGAG	X	CGAA	AAAUJGUU	1900
1482	UUJCCACU	C	AUCUCACU	126	AGUGAGAU	CUGAUGAG	X	CGAA	ACUGGGAA	1901
1485	CCAGUCAU	C	UCACUCUA	127	UAGAGUGA	CUGAUGAG	X	CGAA	AUGACUGG	1902
1487	AGUCAUCU	C	ACUCUACC	128	GGUAGAGU	CUGAUGAG	X	CGAA	AGAUJGACU	1903
1491	AUCUCACU	C	UACCUAUA	129	AUUAGGUU	CUGAUGAG	X	CGAA	AGUGAGAU	1904
1493	CUCACUCU	A	CCUUAUGG	130	CCAUUACG	CUGAUGAG	X	CGAA	AGGUGAGG	1905
1497	CUCUACCU	A	AUGGGUGA	131	UCCACCAU	CUGAUGAG	X	CGAA	AGGUAGAG	1906
1509	GGUGAGGU	U	ACCAACCA	132	UGGUUGUU	CUGAUGAG	X	CGAA	ACCUACCC	1907
1510	GUGAGGUU	A	CCAAACAG	133	CUGGUUGG	CUGAUGAG	X	CGAA	AAACUCCU	1908
1520	CAACAGGU	C	CUUCGCGA	134	UGCGGAAG	CUGAUGAG	X	CGAA	ACUGGUUG	1909
1523	CCAGAGUU	U	CCGCAUCA	135	UGAUJCGG	CUGAUGAG	X	CGAA	AGGACUGG	1910
1524	CAGUCCUU	C	CGCAUCAC	136	GUGAUGGU	CUGAUGAG	X	CGAA	AAAGACUG	1911
1530	UUJCCGCAU	C	ACCAUCCU	137	AGGAGGUU	CUGAUGAG	X	CGAA	AUGCGGAA	1912
1536	AUJACCAU	C	CUUCGCGA	138	UGCGGAAG	CUGAUGAG	X	CGAA	AUGGUAGU	1913
1539	ACCAUCCU	U	CCGCGAGA	139	UGCUGCGG	CUGAUGAG	X	CGAA	AGGAUGGU	1914
1540	CCAUJCCU	C	CGACGCAA	140	UUJGUGCG	CUGAUGAG	X	CGAA	AAGGAGUG	1915
1550	GCAGCAAU	A	CCUGCGGC	141	GCCGCGAG	CUGAUGAG	X	CGAA	AUJGCGUC	1916
1580	GGCCACGU	C	CCAGACAG	142	CGUCUUGG	CUGAUGAG	X	CGAA	ACUGGCCC	1917
1594	ACGACUGU	U	ACAAUGUU	143	AAACUUGU	CUGAUGAG	X	CGAA	ACAGUCGU	1918
1595	CGACUGUU	A	CAGUJUGG	144	CAAAUUGG	CUGAUGAG	X	CGAA	AAACUJCG	1919
1601	UUACAAGU	U	UGCCAUUC	145	AGAUGGCA	CUGAUGAG	X	CGAA	ACUUJGUA	1920
1602	UACAAGUU	U	GCCAUJUC	146	GAGAUGGC	CUGAUGAG	X	CGAA	AAUJUGUA	1921
1608	UUUGCCAU	C	UCACAGUC	147	GACUGUGA	CUGAUGAG	X	CGAA	AUGGCAAA	1922
1610	UGCCAUUC	C	CCAGUCAU	148	AUGACUGU	CUGAUGAG	X	CGAA	AAUGGCAA	1923
1616	CUCACAGU	C	AUCCACGG	149	CCUGGGAU	CUGAUGAG	X	CGAA	ACUGUGAG	1924

Table 18

1619	ACAGUCAU C CACGGGCA	150	UGCCCGUG CUGAUGAG X CGAA AUGACUGU	1925
1632	GGCACUGU U AUGGAGC	151	GCUCUCAU CUGAUGAG X CGAA ACAGUGCC	1926
1633	GCACUGU A UGGGAGCU	152	AGCUCCCA CUGAUGAG X CGAA AACAGUCC	1927
1644	GAGGUGU U AUCUAGGA	153	UCCAUGAU CUGAUGAG X CGAA ACAGUCC	1928
1645	GAGGUGU A UCAUGGAG	154	CUCCAUGA CUGAUGAG X CGAA AACAGCUC	1929
1647	GCUGUUAU C AUGGAGG	155	CCUCUCAU CUGAUGAG X CGAA AUACAGC	1930
1658	GGAGGCU U CUACGUUG	156	CAAUGUAG CUGAUGAG X CGAA AGCCUCC	1931
1659	GAGGCGU C UACGUGU	157	ACAACGUA CUGAUGAG X CGAA AGCCUCC	1932
1661	GGGUCU C CGUGUGU	158	AGACAACG CUGAUGAG X CGAA AGAGUCC	1933
1665	UUCUACGU U GUCUUGA	159	UCAAGAC CUGAUGAG X CGAA ACUGAGAA	1934
1668	UACGUGU C UUGAUGC	160	CGAUCAAA CUGAUGAG X CGAA ACAACGUA	1935
1670	CGUGUGU U UUGCGGG	161	CCGCAUCA CUGAUGAG X CGAA AGCCACAG	1936
1671	GUUGUUAU U GAUGGGC	162	GCCCGAUC CUGAUGAG X CGAA AAGACAAC	1937
1675	UCUUGAU C GGGCCGA	163	UCGGGCC CUGAUGAG X CGAA AUCAAGA	1938
1692	AAACGAU U GGUUGC	164	GCAAGCC CUGAUGAG X CGAA AUUGUUA	1939
1697	AUUGGUU U UGCUUCA	165	UGACAGCA CUGAUGAG X CGAA AGCCAUA	1940
1698	AUUGGUU U GCUUGAG	166	CUGACAG CUGAUGAG X CGAA AGCCAAU	1941
1704	UUGUGU C AGCGUUG	167	CAAGGCU CUGAUGAG X CGAA ACAGCAA	1942
1711	UCAGCGU U GCCAUGG	168	CACAUGCC CUGAUGAG X CGAA AGCGUGA	1943
1730	CGAUGAGU C AGGACGG	169	CCGUCCUG CUGAUGAG X CGAA ACUCUAG	1944
1731	GAUGAGU C AGGACGG	170	GCGGUCC CUGAUGAG X CGAA AACUCAU	1945
1756	AAGGCCU U UUGUACC	171	GGUGACAA CUGAUGAG X CGAA AGGCCUUA	1946
1757	AGGCCU U UGUCACCU	172	AGGUGACA CUGAUGAG X CGAA AAGGCCU	1947
1758	GGCCCUU U GUACACCU	173	AAGGUGAC CUGAUGAG X CGAA AAGGCCU	1948
1761	CCUUUGU C ACCUUGGA	174	UCCAAGGU CUGAUGAG X CGAA ACRAAAG	1949
1766	UGUCACCU U GGACUAGG	175	CCAUGUCC CUGAUGAG X CGAA AGGUGACA	1950
1787	CUGUGGU C CAACAUUC	176	GAUGGUUG CUGAUGAG X CGAA AGCCACAG	1951
1794	UACAACAU U CACACAG	177	GUUGUGG CUGAUGAG X CGAA AUGUUGA	1952
1795	ACAACAU C CACAGAC	178	UGUCUGU CUGAUGAG X CGAA AUGUUGU	1953
1811	AGAUGAGU C AACCUCA	179	UGAGGGU CUGAUGAG X CGAA ACUCAU	1954
1818	UCAACCU C AUGACCAU	180	AUGGUCAU CUGAUGAG X CGAA AGGUGA	1955
1827	AUGACCAU A GCUAUGU	181	ACAUAGGC CUGAUGAG X CGAA AUGUCAU	1956
1832	CAUAGGU C UGUCAUGG	182	CCAUGACA CUGAUGAG X CGAA AGGCUAG	1957
1836	GCCUAGU C AUGGUGC	183	GCAGCCAU CUGAUGAG X CGAA ACAUAGC	1958
1848	GCUGCCAU C UGCGCCU	184	AGGGCGCA CUGAUGAG X CGAA AUGGAGC	1959
1857	UGCGCCU C UUCAUGU	185	AGCAUGAA CUGAUGAG X CGAA AGGGCGCA	1960
1859	CGCGCCU U CAUGGUG	186	GCAGCAUG CUGAUGAG X CGAA AGGAGCG	1961
1860	GCCUUCU C AUGGUGC	187	GGACGAU CUGAUGAG X CGAA AAGAGGC	1962
1872	CUGCCAU C UGCUUCA	188	UAGAGCCA CUGAUGAG X CGAA AUGGCGA	1963
1878	CUCUGGU C AUGGUGU	189	CACACCAU CUGAUGAG X CGAA AGGAGAG	1964
1888	UGUGUGU C AUGGCGC	190	GCGCCAU CUGAUGAG X CGAA ACACACCA	1965
1902	CGUGCCU C CGUGGUU	191	AGGACGC CUGAUGAG X CGAA AUGGAGC	1966
1931	UGAUGAU U UGUGAUG	192	CAUCAGC CUGAUGAG X CGAA AUGUCAU	1967
1932	GAUGACU U GCUAUGA	193	UCAUCAGC CUGAUGAG X CGAA AUGUCAU	1968
1944	GAUGACU C UCCUGGU	194	AGCAGGA CUGAUGAG X CGAA AUGUCAU	1969
1946	UGACAUU C CCUGUGA	195	UCAGCAG CUGAUGAG X CGAA AGAUGUA	1970
1981	CAGAAGU A GAGAUCC	196	GAUAUCU CUGAUGAG X CGAA AUGUCUG	1971
1987	AUAGAGU U CCCUGGA	197	UCCAGGG CUGAUGAG X CGAA AUGUCUA	1972
1988	UAGAGAU C CCCUGGAC	198	GUCCAGG CUGAUGAG X CGAA AUGUCUA	1973
2004	CCACACCU C CGUGGUU	199	GAACACG CUGAUGAG X CGAA AGGUGUG	1974
2011	UCCUGGU U CACUUGG	200	CCAAGUG CUGAUGAG X CGAA ACCACGA	1975

Table 18

2012	CGUGGUGU	C	ACUUGUGU	201	ACCAAGU	CUGAUGAG	X	CGAA	AACCACGG	1976
2016	GGUUCACU	U	UGGUCACA	202	UGUGACCA	CUGAUGAG	X	CGAA	AGUGAACC	1977
2017	GUUCACUU	U	GGUCACAA	203	UUUGUACC	CUGAUGAG	X	CGAA	AAGUGAAC	1978
2021	ACUUGUGU	C	ACCAAGUAG	204	CUACUUGU	CUGAUGAG	X	CGAA	ACCAAGU	1979
2028	UCACAGU	A	GGAACAC	205	GUGUCCUC	CUGAUGAG	X	CGAA	ACUUGUGA	1980
2063	GAGCACCU	C	AGGACCCU	206	AGGGUCCU	CUGAUGAG	X	CGAA	AGGUGUC	1981
2072	AGGACCCU	C	CCCACCCA	207	UGGUGGGG	CUGAUGAG	X	CGAA	AGGGUCCU	1982
2091	AAUGCCU	C	UGCCUAGA	208	UCAAGGCA	CUGAUGAG	X	CGAA	AGGCAUJU	1983
2097	CUUGCCU	U	GAUGGAGA	209	UCUCCAUC	CUGAUGAG	X	CGAA	AGGCAGAG	1984
2129	AGGUGGUU	U	CCAGGAC	210	GUCCUUGG	CUGAUGAG	X	CGAA	ACCCACCU	1985
2130	GGUGGUGU	C	CAGGGACU	211	AGUCCUUG	CUGAUGAG	X	CGAA	AACCACC	1986
2141	AGGACUGU	A	CUGUGAGG	212	CTUACAGG	CUGAUGAG	X	CGAA	AGGACUCC	1987
2147	GUACCGU	A	GGAAACAG	213	CGUUGUCC	CUGAUGAG	X	CGAA	ACAGGUAC	1988
2177	GAGGACU	C	UGUGGCG	214	CGCCAGCA	CUGAUGAG	X	CGAA	AGUGCUUC	1989
2191	GCAGGAU	A	CUUUGGU	215	ACCAAGAG	CUGAUGAG	X	CGAA	AUUCGCCG	1990
2194	GGAAUACU	C	UGGUGCAC	216	GUGACCAA	CUGAUGAG	X	CGAA	AGUAUUC	1991
2196	AAUACCU	U	GGUGACCU	217	AGGUGACC	CUGAUGAG	X	CGAA	AGAGUJU	1992
2200	CUUUGGU	C	ACCUCAA	218	UUUGAGGU	CUGAUGAG	X	CGAA	ACCAAGAG	1993
2205	GUUACCU	C	AAUUAUA	219	UUAAUUUU	CUGAUGAG	X	CGAA	AGGUGACC	1994
2210	CCUCAAUU	U	UAAGUCGG	220	CCGACUUA	CUGAUGAG	X	CGAA	AUUGAGG	1995
2211	CUCAAUUU	U	AAAGUCGG	221	CCCAGCUU	CUGAUGAG	X	CGAA	AAUUGAG	1996
2212	UCAAAUUU	A	AGUGGGGA	222	UCCCGACU	CUGAUGAG	X	CGAA	AAUUAUGA	1997
2216	AUUUAAGU	C	GGGAAAUU	223	AAUUCUCC	CUGAUGAG	X	CGAA	ACUUAUU	1998
2224	CGGAGCU	C	UGUGUCU	224	AGCAGCAG	CUGAUGAG	X	CGAA	AUUCGCCG	1999
2225	GGGAAAUU	C	UGUGUCU	225	AAGCAGCA	CUGAUGAG	X	CGAA	AUUCUCC	2000
2233	CUUGUCU	U	GAACUUC	226	GAAGUUUC	CUGAUGAG	X	CGAA	AGCAGCAG	2001
2240	UGGAAAUU	U	CAGCCUG	227	CAGGCGUC	CUGAUGAG	X	CGAA	AGUUAUAA	2002
2241	UGAAGAUU	C	AGCCUGA	228	UCAGGGCU	CUGAUGAG	X	CGAA	AAUUAUCA	2003
2254	CUGAAGCU	U	UGUCCACC	229	GGUGGACA	CUGAUGAG	X	CGAA	AGGUUCAG	2004
2255	UGAAGCUU	U	GUCCACCA	230	UGUGGAGC	CUGAUGAG	X	CGAA	AAAGUUAU	2005
2258	AGCUUUGU	C	CACCAUUC	231	GAAGUGUG	CUGAUGAG	X	CGAA	ACAAAGGU	2006
2265	UCCACCAU	U	CCUUUAAA	232	UUUAAAGG	CUGAUGAG	X	CGAA	AUGUGGGA	2007
2266	CCACCAUU	C	CUUUAAAU	233	AUUUAAAG	CUGAUGAG	X	CGAA	AAUGUGUG	2008
2269	CCAUUUCU	U	UAUUUUUU	234	AGAAUUUA	CUGAUGAG	X	CGAA	AGGAUUGG	2009
2270	CAUUCUUU	U	AAAUUUCU	235	GAGAAUUU	CUGAUGAG	X	CGAA	AGGAUUUG	2010
2271	AUUCUUUU	A	AAUUCUCC	236	GGAGAAUU	CUGAUGAG	X	CGAA	AAAGGAUU	2011
2275	CUUUAAAU	U	CUCCAAAC	237	GGUUGGAG	CUGAUGAG	X	CGAA	AUUUAAGG	2012
2276	UUUUAAAU	C	UCCAAACC	238	GGGUUGGA	CUGAUGAG	X	CGAA	AAUUAUUA	2013
2278	UAAAUUCU	C	CAACCAAA	239	UUGGUGUG	CUGAUGAG	X	CGAA	AGGAUUUA	2014
2290	CCCAAGAU	A	UUCUUUCU	240	AAGAAGAA	CUGAUGAG	X	CGAA	ACUUGGGG	2015
2292	CAAGGAUU	U	CUUCUUUU	241	AAAAGAGG	CUGAUGAG	X	CGAA	AUACUUUG	2016
2293	AAAGUAUU	C	UUCUUUUC	242	GAAGAAGG	CUGAUGAG	X	CGAA	AUUUAUUU	2017
2295	AGUAUUUU	C	UUUUUUUU	243	AAGAAGAG	CUGAUGAG	X	CGAA	AGAUUUAU	2018
2296	GUUAUUUU	C	UUUUUUUA	244	UAAGAANA	CUGAUGAG	X	CGAA	AGGAUUAC	2019
2298	AUUUUUUU	U	UUUUUAGU	245	ACUAGAGG	CUGAUGAG	X	CGAA	AGAGGAUU	2020
2299	UUUUUUUU	U	UUUUUAGU	246	AAUUAAGA	CUGAUGAG	X	CGAA	AAAGAGAA	2021
2300	UUUUUUUU	U	UUUUUAGU	247	AAAUUAAG	CUGAUGAG	X	CGAA	AAAGAGAA	2022
2301	UUUUUUUU	C	UUUUUUCU	248	GAACUAAA	CUGAUGAG	X	CGAA	AAAGAGAG	2023
2303	UUUUUUUU	U	UUUUUUCG	249	CUGAAACU	CUGAUGAG	X	CGAA	AAAGAGAA	2024
2304	UUUUUUUU	A	UUUUUACA	250	UUUUAUAC	CUGAUGAG	X	CGAA	AAAGAGAG	2025
2307	UUUUUUUU	U	UUUUUAGU	251	ACUUCUGA	CUGAUGAG	X	CGAA	AAUUAAGA	2026

Table 18

2308	UCUUAGUU U CAGAAGUA	252	UACUUCUG CUGAUGAG X CGAA AACUAAGA	2027
2309	CUUAGUUU C AGAAGUAC	253	GUACUUCU CUGAUGAG X CGAA AACUAAG	2028
2316	UCAGAAGU A CUGGCAUC	254	GAUGCCAG CUGAUGAG X CGAA ACUUCUGA	2029
2324	ACUGGCAU C ACACGCAG	255	UCGCGUGU CUGAUGAG X CGAA AUGCCAGU	2030
2335	ACGCAGGU U ACCUUGGC	256	GCCAAGGU CUGAUGAG X CGAA ACCUUGGU	2031
2336	CGCAGGUU A CCUGGCG	257	CGCCAAGG CUGAUGAG X CGAA AACCUUGC	2032
2340	GGUUAUUU U GCGUGUG	258	CACACGCC CUGAUGAG X CGAA AGGUUACC	2033
2350	GCGUGUGU C CCUGUGU	259	ACCACAGG CUGAUGAG X CGAA ACACACGC	2034
2359	CCUGUGGU A CCUGGCA	260	UGCCAAGG CUGAUGAG X CGAA ACCACAGG	2035
2384	ACCAAGCU U GUUUCU	261	AGGGAAGC CUGAUGAG X CGAA AGCUUGGU	2036
2387	AAGCUUGU U UCCUGCU	262	AGCAGGGA CUGAUGAG X CGAA AACAGCUU	2037
2388	AGCUUGUU U CCUGGCU	263	CAGCAGGG CUGAUGAG X CGAA AACAGCU	2038
2389	GCUGUGUU C CCUGUGG	264	CCAGCAGG CUGAUGAG X CGAA AACACAGC	2039
2405	GCCAAAGU C AGUAGGAG	265	UCCCUUCC CUGAUGAG X CGAA ACUUUGGC	2040
2409	AAGUCAGU A GGAGAGGA	266	UCCUUCUCC CUGAUGAG X CGAA ACUGACUU	2041
2426	UGCACAGU U UGCUAUUU	267	AAAUAGCA CUGAUGAG X CGAA ACUGGCA	2042
2427	GCACAGUU U GCUAUUU	268	CAAUAGC CUGAUGAG X CGAA AACUUGC	2043
2431	AGUUUGCU A UUUGCUUU	269	AAAGCAAA CUGAUGAG X CGAA AGCAAACT	2044
2433	UUUGCUAU U UGUUUAG	270	CUAAAGCA CUGAUGAG X CGAA AUAGCAAA	2045
2434	UUUCUAUU U GCUUUAGA	271	UCUAAAGC CUGAUGAG X CGAA AAUAGCAA	2046
2438	UAUUUGCU U UAGAGACA	272	UGUCUCUA CUGAUGAG X CGAA AGCAAAUA	2047
2439	AUUUGCUU U AGAGACAG	273	CUGUCUCU CUGAUGAG X CGAA AAGCAAAU	2048
2440	UUUGCUUU A GAGACAGG	274	CCUGUCUC CUGAUGAG X CGAA AAGCAAA	2049
2455	GGGACUGU A UAAACAAG	275	CUUGUUUA CUGAUGAG X CGAA ACAGUCCC	2050
2457	GACUGUAU A AACAGCC	276	GGCUUGUU CUGAUGAG X CGAA AUACAGUC	2051
2467	ACAAGCCU A ACAUUGU	277	ACCAAGUU CUGAUGAG X CGAA AGGCUUGU	2052
2472	CCUAACAU U GGUGCAA	278	UUUGCACC CUGAUGAG X CGAA AUGUAGG	2053
2484	GCAAAGAU U GCUUCUUG	279	CAAGAGGC CUGAUGAG X CGAA AUUUUUGC	2054
2489	GAUUGCCU C UUGAAUUA	280	UAUUUCAA CUGAUGAG X CGAA AGGCAUUC	2055
2491	UUUGCCUU U GAUUUAAA	281	UUUAAUUC CUGAUGAG X CGAA AGAGGCAA	2056
2496	UCUUGAAU U AAAAAAAA	282	UUUUUUUU CUGAUGAG X CGAA AUUUAAGA	2057
2497	CUUGAAUU A AAAAAAAA	283	UUUUUUUU CUGAUGAG X CGAA AUUUAAG	2058
2510	AAAAAACU A GAAAAAAA	284	UUUUUUUC CUGAUGAG X CGAA AGUUUUUU	2059

Input Sequence = AF190725. Cut Site = G/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCGGUUAGGC or other stem II)
 AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 19

Table 19: Human BACE NCH Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
10	CACGCGUC C GCAGCCCG	285	CGGCGUCG CUGAUGAG X CGAA IACGCGUG	2060
13	GCUGCCGC A GCCCGCCC	286	GGCGGGCG CUGAUGAG X CGAA ICGGACGC	2061
16	UCCGACAGC C CGCCCGGG	287	CCCGGGCG CUGAUGAG X CGAA ICUGCGGA	2062
17	CCGCGAGCC C GCCCGGGA	288	UCCCGGGC CUGAUGAG X CGAA ICGUGCGG	2063
20	CAGCCGCG C CGGGAGCU	289	AGCUCGCG CUGAUGAG X CGAA ICGGCGUG	2064
21	AGCCCGCC C GGGAGCUG	290	CAGCUCGC CUGAUGAG X CGAA ICGGCGUG	2065
28	CGGGGAGC U GCGAGCCG	291	CGGCUCCG CUGAUGAG X CGAA ICUCGCGG	2066
35	CUGCGAGC C GCGAGCUG	292	CAGCUCGC CUGAUGAG X CGAA ICUCGCGG	2067
42	CCGCGAGC U GGAUUAUG	293	CAUAAUCC CUGAUGAG X CGAA ICUCGCGG	2068
56	AUGGUGGC C UGAGCAGC	294	GCUGCUCA CUGAUGAG X CGAA ICCACCAU	2069
57	UGGUGGCC U GAGCAGCC	295	GGCUGCUC CUGAUGAG X CGAA IGCCACCA	2070
62	GCCUGAGC A GCCAACGC	296	GCGUUGGC CUGAUGAG X CGAA ICUCAGGC	2071
65	UCCGACAGC C GCGAGCUG	297	GCUGCGUU CUGAUGAG X CGAA ICUCGCUA	2072
66	GAGCAGCC A ACGCAGCC	298	GGCUGCGU CUGAUGAG X CGAA IGUCGUCU	2073
71	GCACAGCC A CGCCGAGG	299	CCGCGGGC CUGAUGAG X CGAA ICGUGGCG	2074
74	AACGCGAGC C GCAGGAGC	300	GCUCGUCG CUGAUGAG X CGAA ICUCGCUU	2075
77	GCAGCCGC A GAGAGCCG	301	CGGGCUCU CUGAUGAG X CGAA ICDCGUCG	2076
83	GCAGGAGC C CGAGCCCG	302	GGGUCUCC CUGAUGAG X CGAA ICUCGUCG	2077
84	CAGGAGCC C GAGAGCCU	303	AGGGCUCU CUGAUGAG X CGAA IGUCGUCU	2078
90	CCGCGAGC C CUGGCCCG	304	GGGCGAAG CUGAUGAG X CGAA ICUCGCGG	2079
91	CCGAGGCC C UUGCCCCU	305	AGGGGCAA CUGAUGAG X CGAA IGUCGCGG	2080
92	CGGAGCCC U UGCCCCUG	306	CAGGGGCA CUGAUGAG X CGAA IGCGUCGG	2081
96	GGCCUUGC C CGGCGCGG	307	CGGGCAGG CUGAUGAG X CGAA ICAAGGGC	2082
97	CCUUGGCC C CUGCCCGC	308	GGGGGCGG CUGAUGAG X CGAA IGCAAGGG	2083
98	CCUUGGCC C UGCGCGCG	309	CGCGGGCA CUGAUGAG X CGAA IGCGAAGG	2084
99	CUGGCCCC U GCGCGCGG	310	GGCGGGCG CUGAUGAG X CGAA IGCGAAGG	2085
102	GCCCCUGC C CGGCGCGG	311	GGGGGCGG CUGAUGAG X CGAA ICAAGGGC	2086
103	CGCCUUGC C GCGCGCGG	312	GGCGGGCG CUGAUGAG X CGAA ICGAGGGG	2087
108	GCCCGCGC C GCGCGCGG	313	CGGGGCGG CUGAUGAG X CGAA ICGCGGGG	2088
111	CGCGCGCG C GCGCGCGG	314	CGCGGGCG CUGAUGAG X CGAA ICGCGGGG	2089
114	GCCCGCGC C GCGCGGGG	315	CCCGGGCG CUGAUGAG X CGAA ICGCGGGG	2090
115	CGCGCGCC C GCGGGGGG	316	CCCGGGCG CUGAUGAG X CGAA ICGCGGGG	2091
118	CGCGCGCG C GCGGGGAG	317	GUCCCCCG CUGAUGAG X CGAA ICGGGGGG	2092
127	GGGGGAGC C AGGGAAGC	318	GCUUCCCU CUGAUGAG X CGAA IUCCCCCG	2093
128	GGGGGACC A GGGGAAGC	319	GGCUUCCC CUGAUGAG X CGAA IUCCCCCG	2094
136	AGGGAAGC C GCCACCGG	320	CCGUGGCG CUGAUGAG X CGAA ICUCUCCU	2095
139	GAAGCGGC C ACCGGCCC	321	GGGCGGUG CUGAUGAG X CGAA ICGGCUUC	2096
140	AAGCCGCG C ACCGGCGG	322	GGGCGGCG CUGAUGAG X CGAA ICGGCGUU	2097
142	GCGCGCAC C GCGCGCGG	323	GGGCGGCG CUGAUGAG X CGAA IUGCGGGC	2098
146	CCACCGGC C CGGAGGCG	324	GCAUAGCG CUGAUGAG X CGAA ICGGUGGG	2099
147	CACCGGCC C GCCAUGCC	325	GGCAUGGC CUGAUGAG X CGAA ICGGUGGG	2100
150	CGGCGCGC C AUGCCCGG	326	GGGGGCAU CUGAUGAG X CGAA ICGGCGCG	2101
151	GGCCCGCC A UGCGCGCC	327	GGCGGGCA CUGAUGAG X CGAA ICGGGGCG	2102
155	CGCAAGC C CGGCGGCG	328	GAGGGGCG CUGAUGAG X CGAA ICAUGGGG	2103
156	GCAUGGCC C GCGGCGCC	329	GGAGGGCG CUGAUGAG X CGAA ICGAUGGC	2104
159	AUGCGCGC C CCUCCGAG	330	CUGGGGAG CUGAUGAG X CGAA ICGGCGAU	2105
160	UGCCCGCC C CUCCGAGC	331	CGUGGGAG CUGAUGAG X CGAA ICGGGGCA	2106

Table 19

161	GCCCGCCC	C	UCCAGGCC	332	GGCUGGGA	CUGAUGAG	X	CGAA	IGCGGGC	2107
162	CCCGCCCC	U	CCAGGCC	333	GGCUGGG	CUGAUGAG	X	CGAA	IGCGGGG	2108
164	CGCCCUCC	C	CAGCCCG	334	CGGGGCG	CUGAUGAG	X	CGAA	IAGGGCG	2109
165	GGCCCUCC	C	AGCCCGC	335	CGGGGCG	CUGAUGAG	X	CGAA	IAGGGCG	2110
166	CCCCUCCC	A	GCCCCGC	336	GGCGGGC	CUGAUGAG	X	CGAA	IGAGGGG	2111
169	CUCCAGCC	C	CGCGGGG	337	CCCGGGC	CUGAUGAG	X	CGAA	ICUGGGG	2112
170	UCCAGGCC	C	CGCGGGA	338	UCCCGGC	CUGAUGAG	X	CGAA	IGCUGGA	2113
171	CCAGGCC	C	GCGGGAG	339	CUCCGGC	CUGAUGAG	X	CGAA	IGCGGGG	2114
174	AGCCCCC	C	GAGGCC	340	GGCCUCC	CUGAUGAG	X	CGAA	ICGGGGC	2115
181	CGGGAGC	C	CGCGCGC	341	CGGGGCG	CUGAUGAG	X	CGAA	ICUCCCG	2116
182	CGGAGGCC	C	GCGCGGC	342	GCGGGCG	CUGAUGAG	X	CGAA	IGCUCCG	2117
187	CGCGCGC	C	CGCUGCC	343	GGGACGC	CUGAUGAG	X	CGAA	ICGCGGG	2118
188	CCCGGCC	C	GCUGCCA	344	UGGGCAG	CUGAUGAG	X	CGAA	IGCGGGG	2119
191	GCGCCGC	U	GCCAGGC	345	GCCUGGC	CUGAUGAG	X	CGAA	ICGGGGC	2120
194	CCCGCUC	C	CAGCUGG	346	CCAGCCU	CUGAUGAG	X	CGAA	ICAGCGG	2121
195	CGCUGGC	C	AGCUGGC	347	GCCAGCC	CUGAUGAG	X	CGAA	ICAGCGG	2122
196	CGCUGCC	A	GCCUGCC	348	GGCAGCC	CUGAUGAG	X	CGAA	ICGACGC	2123
200	GCCAGGC	U	GGCGCGC	349	CGCGGCG	CUGAUGAG	X	CGAA	ICUUGGC	2124
204	AGCUGGC	C	GCGCGCU	350	ACGGCGC	CUGAUGAG	X	CGAA	ICGACCU	2125
207	CUGCGGC	C	GCGCGGC	351	GGCACGC	CUGAUGAG	X	CGAA	ICGCGCG	2126
210	GCGCGGC	C	GUGCGAU	352	AUCGGAC	CUGAUGAG	X	CGAA	ICGCGGC	2127
215	CGCGGC	C	GAUGAGC	353	GCUACAU	CUGAUGAG	X	CGAA	ICGCGGC	2128
228	UAGCGGC	U	CGGAUCC	354	GGAUCCG	CUGAUGAG	X	CGAA	ICCGGCU	2129
230	GCGGCUC	C	GGAUCCA	355	UGGGAUCC	CUGAUGAG	X	CGAA	IAGCCGC	2130
236	UCGGAUC	C	CAGCCUC	356	AGAGGCG	CUGAUGAG	X	CGAA	IAUCCGA	2131
237	CGGAUCC	C	AGCUCUC	357	GAGAGGU	CUGAUGAG	X	CGAA	IGAUCGG	2132
238	CGGAUCC	A	GCUCUCC	358	GGAGAGC	CUGAUGAG	X	CGAA	IGAUCGG	2133
241	AUCCAGC	C	UCUCCCU	359	AGGGAGA	CUGAUGAG	X	CGAA	ICUGGGA	2134
242	UCCAGCC	U	CUCCCU	360	CAGGGAG	CUGAUGAG	X	CGAA	IGCUGGA	2135
244	CCAGCCU	U	CCCUCCU	361	AGCAGGG	CUGAUGAG	X	CGAA	IAGGCGG	2136
246	AGCCUCC	C	CCUGCUC	362	GGAGCAG	CUGAUGAG	X	CGAA	IAGGGCU	2137
247	GCCUCC	C	CUGCUC	363	GGAGCAG	CUGAUGAG	X	CGAA	IAGAGGC	2138
248	CCUCCU	C	UGCUCCG	364	CGGGACA	CUGAUGAG	X	CGAA	IGGAGGG	2139
249	CUCCUCC	U	GCUCCGU	365	ACGGGAG	CUGAUGAG	X	CGAA	IGGAGAG	2140
252	UCCUCCU	U	CCUGUCU	366	AGCACGG	CUGAUGAG	X	CGAA	ICAGGGG	2141
254	CCUCCU	C	CGUGCUC	367	AGAGCAC	CUGAUGAG	X	CGAA	IAGCAGG	2142
255	CCUCCU	C	CUGCUC	368	CAGAGCA	CUGAUGAG	X	CGAA	IAGAGCG	2143
260	UCCCGUC	U	CUCCGGAU	369	AUCCGAG	CUGAUGAG	X	CGAA	ICACGGG	2144
262	CGGUGUC	U	GCGGAUCU	370	AGAUCCG	CUGAUGAG	X	CGAA	IAGCACG	2145
270	UGCGAUC	U	CCCUAGAC	371	GUCAGGG	CUGAUGAG	X	CGAA	IAUCCGA	2146
272	CGGAUCC	C	CCUAGCC	372	CGGUCAG	CUGAUGAG	X	CGAA	IAGAUCC	2147
273	GGAUCC	C	CGACCGC	373	CGGUCAG	CUGAUGAG	X	CGAA	IAGAUCC	2148
274	GAUCCU	C	UGACCGU	374	AGCGGUA	CUGAUGAG	X	CGAA	IGGAGUC	2149
275	AUCUCCU	U	GACCGUC	375	GAGCGUC	CUGAUGAG	X	CGAA	IGGAGAU	2150
279	CCCGUAC	C	GCUCUCA	376	UGGAGAG	CUGAUGAG	X	CGAA	IUCAGGG	2151
282	CUGACCG	U	CUCCACG	377	CUGUGAG	CUGAUGAG	X	CGAA	ICGGUAC	2152
284	GACCGUC	U	CCACAGC	378	GGCUGGG	CUGAUGAG	X	CGAA	IAGCGUC	2153
286	CCGUCUC	C	ACAGCCG	379	CGGCGUG	CUGAUGAG	X	CGAA	IAGAGCG	2154
287	CGUCUCC	A	CAGCCCG	380	CCGCGUG	CUGAUGAG	X	CGAA	IAGAGCG	2155
289	CUCCUCC	A	GCCCGGAC	381	GUCCGGC	CUGAUGAG	X	CGAA	IUGGAGG	2156
292	UCCACAG	C	CGGACCG	382	CGGCGUC	CUGAUGAG	X	CGAA	ICUGUGA	2157

Table 19

293	CCACAGCC	C	GGACCCGG	383	CCGGGUCC	CUGAUGAG	X	CGAA	IGCUGUGG	2158
298	GCCCGGAC	C	CGGGGGCU	384	AGCCCCCG	CUGAUGAG	X	CGAA	TUCGGGGC	2159
299	CCCGGACC	C	GGGGGCGU	385	CAGCCCCC	CUGAUGAG	X	CGAA	TGUCGGGG	2160
306	CCGGGGGC	U	GGCCCAAG	386	CCUGGGCC	CUGAUGAG	X	CGAA	TCGCCGGG	2161
310	GGGCGUGC	C	CAGGGCCC	387	GGGCCUUG	CUGAUGAG	X	CGAA	TCACAGCC	2162
311	GGCUGGCC	C	AGGGCCCU	388	AGGGCCCU	CUGAUGAG	X	CGAA	IGCCAGCC	2163
312	GCUGGGCC	A	GGGCCUGU	389	CAGGGCCC	CUGAUGAG	X	CGAA	IGGCCAGC	2164
317	CCCAGGGC	C	CUGCAGGC	390	GCCUGGAC	CUGAUGAG	X	CGAA	TCGCCUGG	2165
318	CCAGGGCC	C	UGCAGGCC	391	GGCCUGCA	CUGAUGAG	X	CGAA	TGCCUGGC	2166
319	CAGGGCCC	U	GCAGGCCC	392	GGGCCUGC	CUGAUGAG	X	CGAA	TGGCCUGG	2167
322	GGCCGUGC	A	GGCCCUUG	393	CCAGGGCC	CUGAUGAG	X	CGAA	TCAGGGCC	2168
326	CGCAGGAC	C	CUGGCGUC	394	GACGCCAG	CUGAUGAG	X	CGAA	TCUUGGAC	2169
327	UGCAGGCC	C	UGGCGUCC	395	GGACGCCA	CUGAUGAG	X	CGAA	TGCCUGCA	2170
328	GCAGGCCC	U	GGCGUCCU	396	AGGACGCC	CUGAUGAG	X	CGAA	TGGCCUGC	2171
335	CAGGCGUC	C	UGAUGCCC	397	GGGCAUCA	CUGAUGAG	X	CGAA	TACGCCAG	2172
336	UGGCGUCC	U	GAUGCCCC	398	GGGGCAUC	CUGAUGAG	X	CGAA	TGAGCCAG	2173
342	CCUGAGGC	C	CCCAAGCU	399	AGCUUGGG	CUGAUGAG	X	CGAA	TCACAGGG	2174
343	CUGAUGCC	C	CCAAGCUC	400	GAGCUUGG	CUGAUGAG	X	CGAA	TGCAUCAG	2175
344	UGAUGGCC	C	CAAGCUCC	401	GGAGCUUG	CUGAUGAG	X	CGAA	TGGCAUCA	2176
345	GAUGCCCC	C	AAGCUCCC	402	GGGAGCUU	CUGAUGAG	X	CGAA	TGGGCAUC	2177
346	AUGCCCCC	C	AGUCCCUU	403	AGGGAGCU	CUGAUGAG	X	CGAA	TGGGCAUC	2178
350	CCCCAGGC	U	CCUCCUCC	404	GGAGAGGG	CUGAUGAG	X	CGAA	TGUGGGGG	2179
352	CAAGCUC	C	CUCUCCUG	405	CAGGAGAG	CUGAUGAG	X	CGAA	TGAGCUGG	2180
353	CAAGCUC	C	UCUCCUGA	406	UCAGGAGA	CUGAUGAG	X	CGAA	TGAGCUGG	2181
354	AAGCUC	U	CUCUAGAG	407	CUCAGGAG	CUGAUGAG	X	CGAA	TGAGCUGG	2182
356	GCUCCUCC	U	CUGAGAA	408	UUCUCAGG	CUGAUGAG	X	CGAA	TGAGGAGC	2183
358	UCCUCCUC	C	UGAGAAGC	409	GCUCUCA	CUGAUGAG	X	CGAA	TAGAGGGA	2184
359	CCCUCCUC	U	GAGAAGCC	410	GGUUCUC	CUGAUGAG	X	CGAA	TAGAGGAG	2185
367	UGAGAAGC	C	ACCAGCAC	411	GGUCUGU	CUGAUGAG	X	CGAA	TCUUCUCA	2186
368	GAGAAGCC	A	CCAGCAC	412	GGUGCUGC	CUGAUGAG	X	CGAA	TCUUCUCA	2187
370	GAGCCAC	C	AGCACAC	413	GUGGUGCU	CUGAUGAG	X	CGAA	TGUGCUCU	2188
371	AAGCCACC	A	GCACCACC	414	GGUGGUGC	CUGAUGAG	X	CGAA	TGUGCUCU	2189
374	CCACCAGC	A	CCACCAG	415	CUGGUGGG	CUGAUGAG	X	CGAA	TCUGGUGG	2190
376	ACCAGCAC	C	ACCAGAC	416	GUUUGGUG	CUGAUGAG	X	CGAA	TGUGCUGU	2191
377	CCAGCAC	A	CCAGACU	417	AGUCUGGG	CUGAUGAG	X	CGAA	TGUGCUGG	2192
379	AGCACCC	C	CAGACUUG	418	CAAGUCUG	CUGAUGAG	X	CGAA	TGUGGUGU	2193
380	GCACCACC	C	AGACUUGG	419	CCAAGUCU	CUGAUGAG	X	CGAA	TGUGGUGC	2194
381	CACCAACC	A	GACUUGGG	420	CCCAAGUC	CUGAUGAG	X	CGAA	TGUGGUGG	2195
385	ACCAGAGC	U	UGGGGGCA	421	UGCCCCCA	CUGAUGAG	X	CGAA	TGUGGUGU	2196
393	UUGGGGGC	A	GGCGCCAG	422	UGGCGCCC	CUGAUGAG	X	CGAA	TCGCCCAA	2197
399	GCAGCGGC	C	AGGGACGG	423	CCGUGCCU	CUGAUGAG	X	CGAA	TCGCCUGC	2198
400	CAGCGGCC	A	GGAGCGGA	424	UCGUGCCC	CUGAUGAG	X	CGAA	TCGCCUGG	2199
416	ACGUGGGC	C	AGUGCGAG	425	CUCGCACU	CUGAUGAG	X	CGAA	TCGCACGU	2200
417	CUGUGGCC	A	UGCGGAGC	426	GCUCGCAC	CUGAUGAG	X	CGAA	TGCCACAG	2201
426	GUGCGAGC	C	CAGAGGGC	427	GCCUCUGG	CUGAUGAG	X	CGAA	TCUGGCAC	2202
427	UGCGAGCC	C	AGAGGGCC	428	GGCCUCCU	CUGAUGAG	X	CGAA	TCUGGCAC	2203
428	GCAGGCCC	A	GAGGGCCC	429	GGGCCUCC	CUGAUGAG	X	CGAA	TCUGGCAC	2204
435	CAGAGGGC	C	CGAAGGCC	430	GGCCUUGG	CUGAUGAG	X	CGAA	TCGCCUGU	2205
436	AGAGGGCC	C	GAAGGCCG	431	CGGCGUCC	CUGAUGAG	X	CGAA	TGCCUCCU	2206
443	CCGAAGGC	C	GGGGCCCA	432	UGGGCCCC	CUGAUGAG	X	CGAA	TCUUCGGG	2207
449	GCCGGGGC	C	CACCAUGG	433	CCAUGGUG	CUGAUGAG	X	CGAA	TCGCCGGC	2208

Table 19

450	CCGGGGCC C	ACCAUGGC	434	GCACGUGU	CUGAUGAG X	CGAA	IGCCCCCG	2209
451	CCGGGGCC C	CCAUGGCC	435	GGCCAUGG	CUGAUGAG X	CGAA	IGGGCCCC	2210
453	GGGCCACC C	AUGGCCCA	436	UGGGCCAU	CUGAUGAG X	CGAA	IUGGGCCC	2211
454	GGCCCAAC A	UGGGCCAA	437	UUGGGCCA	CUGAUGAG X	CGAA	IGUGGGCC	2212
459	ACCAUGGC C	CAGGCCCU	438	AGGGCUUG	CUGAUGAG X	CGAA	ICCAUGGU	2213
460	CCAUGGCC C	AAGGCCUG	439	CAGGGCUU	CUGAUGAG X	CGAA	IGCCAUGG	2214
461	CAUGGCCC A	AGGCCUGC	440	GCAGGGCU	CUGAUGAG X	CGAA	IGGCCAUG	2215
465	GGCCCAAG C	CUGGCCUG	441	CAGGGCAG	CUGAUGAG X	CGAA	IUCUUGGG	2216
466	CCCAAGCC C	UGGCCUGG	442	CCAGGGCA	CUGAUGAG X	CGAA	IGCUUGGG	2217
467	CCAAGCCC U	GGCCUGGC	443	GCCAGGGC	CUGAUGAG X	CGAA	IGGCUUGG	2218
470	AGCCUUGC C	CUGGCCUC	444	GGAGCCAG	CUGAUGAG X	CGAA	ICAGGGCU	2219
471	GGCCUGCC C	UGGCCUCU	445	AGGAGCCA	CUGAUGAG X	CGAA	IGCAGGGC	2220
472	CCUUGGCC U	GGCUCUGG	446	CAGGAGCC	CUGAUGAG X	CGAA	IGGCAGGG	2221
476	GGCCUGGC U	CCUUGUGU	447	ACAGCAGG	CUGAUGAG X	CGAA	ICAGGGCC	2222
478	CCUGGCCU C	UGCUGUGG	448	CCACAGCA	CUGAUGAG X	CGAA	IAGCCAGG	2223
479	UUGGCCUC U	GCUGUGGA	449	UCCACAGC	CUGAUGAG X	CGAA	IGAGCCAG	2224
482	GUCCUGUC U	UGUGAUGG	450	CCAUCCAG	CUGAUGAG X	CGAA	ICAGGAGC	2225
503	GGGAGUGU U	GGCUGCCC	451	GGGCAGGC	CUGAUGAG X	CGAA	ICACUCCC	2226
506	AGUGUGUC C	UGGCCACG	452	CGUGGGCA	CUGAUGAG X	CGAA	ICAGCACU	2227
507	GUUGUGCC U	GGCCACGG	453	CCUGGGGC	CUGAUGAG X	CGAA	IGCAGCAC	2228
510	GUCCUGUC C	CAGGGCAC	454	GUGCCGUG	CUGAUGAG X	CGAA	ICAGCCAG	2229
511	UGCCUGCC C	ACAGCACCC	455	GGUGCCGU	CUGAUGAG X	CGAA	IGCAGGCA	2230
512	GGCUGGCC A	CGGACACC	456	GGGUGCCG	CUGAUGAG X	CGAA	IGGCAGGC	2231
517	CCACAGAC C	CCAGCAC	457	GUCCUGGG	CUGAUGAG X	CGAA	IUGCCGUG	2232
519	CACGACAC C	CAGCACGG	458	CCGUGCUG	CUGAUGAG X	CGAA	IUGCCGUG	2233
520	ACGGCACCC C	AGCACGGC	459	GCGUGUCU	CUGAUGAG X	CGAA	IUGCCGUG	2234
521	CGGCACCC A	GCACGGCA	460	UGCCGUGC	CUGAUGAG X	CGAA	IGGUGCCG	2235
524	CACCCAGC A	CGGCAUCC	461	GGAGUCCG	CUGAUGAG X	CGAA	IUGGGUGG	2236
529	AGCACGGC A	UCCGCGUG	462	CAGCCGGA	CUGAUGAG X	CGAA	IUGGUGCU	2237
532	ACGGCAUC C	GGCUGCCC	463	GGCCAGCC	CUGAUGAG X	CGAA	IUGGCGUG	2238
536	CAUCCGUC U	GGCCUGGC	464	GCAGGGGC	CUGAUGAG X	CGAA	ICCGGAGX	2239
539	CGGCGUGC C	CCUGGCAC	465	UGCGCAGG	CUGAUGAG X	CGAA	ICAGCCGG	2240
540	CGGCGUGC C	CUGGCGAG	466	GUGCGCAG	CUGAUGAG X	CGAA	IGCAGCCG	2241
541	GGCUGGCC C	UGGCGAGC	467	GCUGCGCA	CUGAUGAG X	CGAA	IGGCAGCC	2242
542	GCUGCCCC U	GGCGAGCG	468	CGCUGGCG	CUGAUGAG X	CGAA	IGGCGAGC	2243
547	CCUGCGGC A	GGGCGCUG	469	CAGGCGGC	CUGAUGAG X	CGAA	ICGCGAGG	2244
553	GCAGCGGC C	UGGCGGGC	470	GCGCCCA	CUGAUGAG X	CGAA	ICGCGCUG	2245
554	CAGCGGCC U	GGGCGGGC	471	CGCCCCCC	CUGAUGAG X	CGAA	IGCCCGUG	2246
564	GGGGCGGC C	CCCCUGGG	472	CCGAGGGG	CUGAUGAG X	CGAA	ICGCCCCC	2247
565	GGGGCGGC C	CCCCUGGG	473	CCGAGGGG	CUGAUGAG X	CGAA	IGGCGCCC	2248
566	GGGGCGGC C	CCCCUGGG	474	GCGCCCGG	CUGAUGAG X	CGAA	IGGCGCCC	2249
567	GGGGCGGC C	CCCCUGGG	475	AGCCCCAG	CUGAUGAG X	CGAA	IGGGCGCC	2250
568	GGGGCGGC C	UGGGGCGU	476	CAGCCCCA	CUGAUGAG X	CGAA	IGGGCGCC	2251
569	GGGGCGGC U	GGGGGCGC	477	GCAGCCCC	CUGAUGAG X	CGAA	IGGGGCGG	2252
575	CCUGGGGC U	GGCGGCGC	478	GCAGCCGC	CUGAUGAG X	CGAA	ICCCAGAG	2253
581	GCUGCGGC U	GGCCGCGG	479	CCCGGGGC	CUGAUGAG X	CGAA	ICCCAGAG	2254
584	GGGCGGCG C	CGGGGAGA	480	UCUCCCGG	CUGAUGAG X	CGAA	ICAGCCGC	2255
585	GGGCGGCC C	CGGGGAGC	481	GUCUCCCG	CUGAUGAG X	CGAA	IGCAGCCG	2256
586	GGGCGGCC C	GGGAGACC	482	GGUCUCCC	CUGAUGAG X	CGAA	IGGCGGCC	2257
594	CGGAGAGC C	GACGAAGA	483	UCUUCGUC	CUGAUGAG X	CGAA	IUCUCCCG	2258
605	CGAAGAGC C	CGAGGAGC	484	GCUCUCCG	CUGAUGAG X	CGAA	IUCUUCUG	2259

Table 19

606	GAAGAGCC	C	GAGGAGCC	485	GGCUCUCU	CUGAUGAG	X	CGAA	IGCUCUUC	2260
614	CGAGGAGC	C	CGGCCGGA	486	UCCGGCCG	CUGAUGAG	X	CGAA	ICUCUCUG	2261
615	GAGGAGCC	C	GGCCGGAG	487	CUCGGCCG	CUGAUGAG	X	CGAA	IGCUCUCU	2262
619	AGCCGGGC	C	GGAGGGGC	488	GCOCUCUC	CUGAUGAG	X	CGAA	ICCGGGUC	2263
628	GGAGGGGC	A	GCTUGUG	489	CACAAAGC	CUGAUGAG	X	CGAA	ICCCUUCU	2264
631	GGGGCAGC	U	UUGUGGAG	490	CUCACAA	CUGAUGAG	X	CGAA	ICUGCCUC	2265
649	UGGUGGAC	A	ACCUGAGG	491	CCUCAGGU	CUGAUGAG	X	CGAA	IUCCACCA	2266
652	UGGACAAC	C	UGAGGGGC	492	GCCCCUCA	CUGAUGAG	X	CGAA	IUGUGCUA	2267
653	GGACAACC	U	GAGGGGCA	493	UGCCCCUC	CUGAUGAG	X	CGAA	IUGUUCUC	2268
661	UGAGGGGC	A	AGUCGGGG	494	CCCCGACU	CUGAUGAG	X	CGAA	ICCCUCCA	2269
671	GUCCGGGC	A	GGGCUACU	495	AGUAGCCC	CUGAUGAG	X	CGAA	ICCCCGAC	2270
676	GGCAGGCG	U	ACUACGUG	496	CACGUAGU	CUGAUGAG	X	CGAA	ICCCUGCC	2271
679	AGGGCUAC	U	ACUGGGAG	497	CUCACAGU	CUGAUGAG	X	CGAA	IUAGCCCU	2272
693	GGAUGAC	C	GUGGGCAG	498	CUGCCCCA	CUGAUGAG	X	CGAA	IUCUACUC	2273
700	CUGUGGAC	A	GGCCCGCG	499	CGGGGGGC	CUGAUGAG	X	CGAA	ICCCACGG	2274
703	UGGGCAGC	C	CCCCGACG	500	CUGCGGGG	CUGAUGAG	X	CGAA	ICUGCCCA	2275
704	GGCAGGCC	C	CCCCGAGA	501	UCUGGGGG	CUGAUGAG	X	CGAA	ICCCUGCC	2276
705	GGCAGCCC	C	CGCGAGAC	502	GUUGCGGG	CUGAUGAG	X	CGAA	IGGUGGCC	2277
706	GCAGCCCC	C	CGCGAGCG	503	CGUCUGCG	CUGAUGAG	X	CGAA	IGGGCUGC	2278
707	GCAGCCCC	C	GCAGAGCG	504	GCUGUCUG	CUGAUGAG	X	CGAA	IGGGGGUG	2279
710	CCCGCGCG	A	GACGCUCA	505	UGAGCGUC	CUGAUGAG	X	CGAA	ICGGGGGG	2280
716	CGCAGGAC	A	ACAUAUCC	506	GGAGUGUG	CUGAUGAG	X	CGAA	ICGUGGCG	2281
718	AGACGCUA	A	ACAUCUUG	507	CAGGAUGU	CUGAUGAG	X	CGAA	IAGGUCUC	2282
721	CGCUCAAC	A	UCUUGGUG	508	CACCAAGG	CUGAUGAG	X	CGAA	IUUGAGCG	2283
724	UCAACAUC	C	UGGUGGAU	509	AUCCACCA	CUGAUGAG	X	CGAA	IAGUGAGA	2284
725	CAACAUCU	U	GGUGGAUA	510	UAUCCACC	CUGAUGAG	X	CGAA	IAGUGUGU	2285
735	UGGAGUAC	A	GGCAGCAG	511	CUGCUGCC	CUGAUGAG	X	CGAA	IUAUCCAC	2286
739	AUACAGGC	A	GCAGUAC	512	GUUACUGC	CUGAUGAG	X	CGAA	ICCUUGAU	2287
742	CAGGCAGC	A	GUAAUCUU	513	AAAGUUAU	CUGAUGAG	X	CGAA	ICUGCCUG	2288
748	GCAGUAAU	U	UGGAGUGU	514	CACUGCAA	CUGAUGAG	X	CGAA	IUUAUCUG	2289
753	AACUUGAC	U	UGGGGUGC	515	GCACCCAC	CUGAUGAG	X	CGAA	ICAAAGUU	2290
762	GUUGGUGC	U	GGCCCGCA	516	UGGGGGGC	CUGAUGAG	X	CGAA	ICACCCAC	2291
765	GGUGUGUC	C	CCCCACCC	517	GGGUGGGG	CUGAUGAG	X	CGAA	ICAGCACC	2292
766	GGUGUGCC	C	CCCAACCC	518	GGGGUGGG	CUGAUGAG	X	CGAA	IGCACGAC	2293
767	UGUCGCCC	C	CAACCCCU	519	AGGGGUGG	CUGAUGAG	X	CGAA	IGGCAAGC	2294
768	GUUGCCCC	C	CACCCCUU	520	AAGGGGUG	CUGAUGAG	X	CGAA	IGGGCAGC	2295
769	CUGCCCCC	A	CCCCUUCU	521	GAAGGGGU	CUGAUGAG	X	CGAA	IGGGGCAG	2296
770	UGCCCCCC	A	CCCCUUCU	522	GGAGGGGG	CUGAUGAG	X	CGAA	IGGGGGCA	2297
772	CCCCCCAC	C	CCUUCUUG	523	CAGGAAGG	CUGAUGAG	X	CGAA	IUGGGGGG	2298
773	CCCCCACC	C	CUUUCUGC	524	GCAGGAAG	CUGAUGAG	X	CGAA	IGUGGGGG	2299
774	CCCCCACC	C	UUCUCUGA	525	UGCAGGAA	CUGAUGAG	X	CGAA	IGGUGGGG	2300
775	CCCCCUCU	U	UCCUCGAU	526	AUGCAGGA	CUGAUGAG	X	CGAA	IUGGUGGG	2301
778	ACCCUUCU	C	UGCAUCGC	527	GGCAUGCA	CUGAUGAG	X	CGAA	IAGGGGUG	2302
779	CCCUUUCU	U	GCAUGGCU	528	AGCGAUGC	CUGAUGAG	X	CGAA	IGAGGGGG	2303
782	CUUCUUGC	A	UCGCUACU	529	AGUAGCGA	CUGAUGAG	X	CGAA	ICAGGAAG	2304
787	UGCAUCGC	U	ACUACGAG	530	CUGGUAGU	CUGAUGAG	X	CGAA	ICGAUGCA	2305
790	AUCGCUAC	U	ACCAGAGG	531	CCUCUGGU	CUGAUGAG	X	CGAA	IUCAGCGAU	2306
793	GUUACUAC	C	AGAGGCAG	532	CUGCCUCU	CUGAUGAG	X	CGAA	IUAUAGUC	2307
794	CUACUACC	A	GAGGCAGC	533	GCUGCCUC	CUGAUGAG	X	CGAA	IUGAUGAG	2308
800	CCAGAGGC	A	GCTUUCUA	534	UGGACAGC	CUGAUGAG	X	CGAA	ICCUUGUG	2309
803	GAGGCAGC	U	GUCCAGCA	535	UGCUGGAC	CUGAUGAG	X	CGAA	ICUGCCUC	2310

Table 19

807	CAGCUGUC	C	AGCAUA	536	UAUGUGCU	CUGAUGAG	X	CGAA	IACAGCUG	2311
808	AGCUGUCC	A	GCACAUAC	537	GUAGUGGC	CUGAUGAG	X	CGAA	IGACAGCU	2312
811	UGUCCAGC	A	CAUACCGG	538	CCGGUAUG	CUGAUGAG	X	CGAA	ICUGGACA	2313
813	UCCAGCAC	A	UACCGGGA	539	UCCCGGUA	CUGAUGAG	X	CGAA	IUGCUGGA	2314
817	GCAUAUAC	C	GGAACCU	540	GAGGUCCC	CUGAUGAG	X	CGAA	IUAUGUGC	2315
823	ACCGGGAC	C	UCCGGAAG	541	CUUCCGGA	CUGAUGAG	X	CGAA	IUCCCGGU	2316
824	CCGGGACC	U	CCGGAAGG	542	CCUUCGGG	CUGAUGAG	X	CGAA	IUGCCCGG	2317
825	GGGACCU	C	GGAAGGUG	543	ACCCUCCC	CUGAUGAG	X	CGAA	IAGGUGCC	2318
845	GUAGUGGC	C	CUACACCC	544	GGGUGUAG	CUGAUGAG	X	CGAA	IGACAUAC	2319
846	UAUGUGCC	C	UACACCCA	545	UGGGUGUA	CUGAUGAG	X	CGAA	IGACAUUA	2320
847	AUGUGCCC	U	ACACCCAG	546	CUGGGUGU	CUGAUGAG	X	CGAA	IGGCACAU	2321
850	UGCCUAGC	A	CCCAGGGC	547	GCCTUGGG	CUGAUGAG	X	CGAA	IUAUGGCA	2322
852	CCCUACAC	C	CAGGGCAA	548	UUGCCCGU	CUGAUGAG	X	CGAA	IUGUAGGG	2323
853	CCUACACC	C	AGGGCAAG	549	CUUCCCGU	CUGAUGAG	X	CGAA	IUGUAGGG	2324
854	UACACACC	A	GCGCAAGU	550	ACUUGCCC	CUGAUGAG	X	CGAA	IGGUGUAG	2325
859	CCGAGGGC	A	AGUGGGAA	551	UUCGCCAU	CUGAUGAG	X	CGAA	ICCUGGGG	2326
875	AGGGGAAG	C	GCGCACCG	552	CGUGGCCG	CUGAUGAG	X	CGAA	IUCUCCCU	2327
880	AGCUGGGC	A	CCGACCU	553	CAGGUCGG	CUGAUGAG	X	CGAA	IGCCACGU	2328
882	CUGGGCAC	C	GACCUUGU	554	ACCAGGUC	CUGAUGAG	X	CGAA	IUGCCAG	2329
886	GCACCGAC	C	UGGUUAAG	555	GCUUACCA	CUGAUGAG	X	CGAA	IUCGUGUC	2330
887	CACCGACC	U	GGUUAAGCA	556	UGCUUACC	CUGAUGAG	X	CGAA	IUGCGGUG	2331
895	UGGUUAAG	C	UGCCCAU	557	AUGGGGGA	CUGAUGAG	X	CGAA	IUAUACCA	2332
898	UAAGCAUC	C	CCCAUGGC	558	GCCAUGGG	CUGAUGAG	X	CGAA	IAGUGCUA	2333
899	AAGCAUCC	C	CCAUGGCC	559	GGCCAUGG	CUGAUGAG	X	CGAA	IAGUGCUU	2334
900	AGCAUCCC	C	CAUGGCC	560	GGGCCAUG	CUGAUGAG	X	CGAA	IGGUAUGC	2335
901	GCAUCCCC	C	UGGCCCCC	561	GGGCCCAU	CUGAUGAG	X	CGAA	IGGGAUCC	2336
902	CAUCCCCC	A	UGGCCCCA	562	UGGGGCCA	CUGAUGAG	X	CGAA	IGGGGAUG	2337
907	CCCAUGGC	C	CCAACGUC	563	GACGUGGG	CUGAUGAG	X	CGAA	IACCAUGG	2338
908	CCAUGGCC	C	CAACGUC	564	UGACGUGG	CUGAUGAG	X	CGAA	IGCCGAUG	2339
909	CAUGGGCC	C	AACGUCAC	565	GUGACGUT	CUGAUGAG	X	CGAA	IGGCACUG	2340
910	AUGGGCCC	A	ACGUCACU	566	AGUGACGU	CUGAUGAG	X	CGAA	IGGGCCAU	2341
916	CCAACGUC	A	CUGUGCGU	567	ACGACACG	CUGAUGAG	X	CGAA	IACGUGGG	2342
918	AACGUCAC	U	GUGCGUGC	568	GCACGCAC	CUGAUGAG	X	CGAA	IUGACGUG	2343
927	GUGCGUGC	C	AACAUUGC	569	GCAUUGUU	CUGAUGAG	X	CGAA	IGACGCAC	2344
928	UGCGUGCC	A	ACAUAUGC	570	AGCAUUGU	CUGAUGAG	X	CGAA	IGCACGCA	2345
931	GUGGCAAC	A	UUGUGGCC	571	GGCAGCAA	CUGAUGAG	X	CGAA	IUGGACAC	2346
936	AACAUUGC	U	GCGAUGUC	572	GUGAUGGC	CUGAUGAG	X	CGAA	IACUUGUU	2347
939	AUUGCUGC	C	AUACUGA	573	UCAGUGAU	CUGAUGAG	X	CGAA	ICAGCAAU	2348
940	UUGCUGCC	A	UCAUGUA	574	UUAUGUGA	CUGAUGAG	X	CGAA	IGCAGCAA	2349
943	CUGCAUAC	A	CUGAAUCA	575	UGAUUACG	CUGAUGAG	X	CGAA	IAGGACAG	2350
945	GCAUCUAC	U	GAUUCAGA	576	UCUGAUUC	CUGAUGAG	X	CGAA	IUGAUGGC	2351
951	ACUGAAUC	A	GACAAUGU	577	AACUUGUC	CUGAUGAG	X	CGAA	IACUUGAU	2352
955	AUUCAGAC	A	AGUUCUUC	578	GAAGAACU	CUGAUGAG	X	CGAA	IUCUGAUU	2353
961	ACAAUGUC	U	UCAUCAAC	579	GUUGAUGA	CUGAUGAG	X	CGAA	IACUUGU	2354
964	AGUUCUUC	A	UCAACGGC	580	GCCGUGUA	CUGAUGAG	X	CGAA	IAGGAACU	2355
967	UCUUAUAC	A	ACGGCUCC	581	GAGGCCGU	CUGAUGAG	X	CGAA	IAGUAGGA	2356
973	UCAAACGC	U	CCAACUGG	582	CCAGUUGG	CUGAUGAG	X	CGAA	IAGGUGUA	2357
975	AACGGUCC	C	AACUGGGA	583	UCCGAGUU	CUGAUGAG	X	CGAA	IAGCCGUG	2358
976	ACGGCUCC	A	ACUGGGAA	584	UCCCGAGU	CUGAUGAG	X	CGAA	IGAGCCGU	2359
979	GCUCCAAC	U	GGGAAGGC	585	GCUCUCCC	CUGAUGAG	X	CGAA	IUGGGAGC	2360
988	GGGAAGGC	A	UCCUGGCG	586	CCCCAGGA	CUGAUGAG	X	CGAA	ICCUUCCC	2361

Table 19

991	AAGGCAUC	C	UGG3GCU	587	CAGCCCCA	CUGAUGAG	X	CGAA	TAUGCCUU	2362
992	AGGCAUCC	U	GGGGUCG	588	CCAGCCCC	CUGAUGAG	X	CGAA	IGAUGCCU	2363
998	CCUGGGGC	U	GCCCUAUG	589	CAUAGGCC	CUGAUGAG	X	CGAA	ICCCAGAG	2364
1002	GGGUGGCC	C	UAUUCUGA	590	UCAGCAUA	CUGAUGAG	X	CGAA	ICCAGGCC	2365
1003	GGCUGGCC	U	AUGCUGAG	591	CUCAGCAU	CUGAUGAG	X	CGAA	IGCCAGCC	2366
1008	GCCUAUUC	U	GAGAUUGC	592	GCAUUCUC	CUGAUGAG	X	CGAA	ICAAUGGC	2367
1017	GAGAUUGC	C	AGGCCUGA	593	UCAGGCCU	CUGAUGAG	X	CGAA	ICAAUUCU	2368
1018	AGAUUGCC	A	GGCCUGAC	594	GUCAGGCC	CUGAUGAG	X	CGAA	IGCAUUCU	2369
1022	UGCCAGGC	C	UGACGACU	595	AGUCGUGA	CUGAUGAG	X	CGAA	ICGUGCCA	2370
1023	GCCAGGCC	U	GACGACUC	596	GAGUCGUC	CUGAUGAG	X	CGAA	IGCCUGGC	2371
1030	CUGACGAC	U	CCUGGAG	597	CUCCAGGG	CUGAUGAG	X	CGAA	IUCGUCAG	2372
1032	GACGACUC	C	CUGGAGCC	598	GGCUCGAG	CUGAUGAG	X	CGAA	IAGUCGUC	2373
1033	ACGACUCC	C	UGGAGCCU	599	AGGCUCCA	CUGAUGAG	X	CGAA	IGAGUCGU	2374
1034	CGACUCCC	U	GGAGCCUU	600	AAGGCUCC	CUGAUGAG	X	CGAA	IGGAGUCG	2375
1040	CCUGGAGC	C	UUCUUGUG	601	CAAGAGAA	CUGAUGAG	X	CGAA	IUCUCCAG	2376
1041	CUGGAGCC	U	UUCUUUGA	602	UCAAGGAA	CUGAUGAG	X	CGAA	IGCUCGAG	2377
1045	AGGCUUCC	U	UUGACUCU	603	AGAGUCAA	CUGAUGAG	X	CGAA	IAAGGUCU	2378
1051	UCUUUGAC	U	CCUGUGUA	604	UACCCAGG	CUGAUGAG	X	CGAA	IUCAGGAA	2379
1053	UUUGACUC	U	CUGGUAUA	605	UUUACGAG	CUGAUGAG	X	CGAA	IGGAGCAA	2380
1055	UGACUCUC	U	GGUAAAGC	606	GCUUUACC	CUGAUGAG	X	CGAA	IAGAGUCA	2381
1064	GGUAAAGC	A	GACCAACG	607	CGUGGGUC	CUGAUGAG	X	CGAA	IUCUUACC	2382
1068	AAGCAGAC	C	CACGUUCC	608	GGAACGUG	CUGAUGAG	X	CGAA	IUCUUCGU	2383
1069	AGCAGACC	C	ACGUUCCC	609	GGGAACGU	CUGAUGAG	X	CGAA	IGUCUGCU	2384
1070	GCAGACCC	A	CGUCCCCA	610	UGGGAACG	CUGAUGAG	X	CGAA	IGGAGUCG	2385
1076	CCACGUUC	C	CAACUUCU	611	AGAGGUUG	CUGAUGAG	X	CGAA	IAACGUGG	2386
1077	CACGUUCC	C	AACCUUCU	612	AAGAGGUU	CUGAUGAG	X	CGAA	IGAACGUG	2387
1078	ACGUUCCC	A	ACCUUUCU	613	GAAGAGGU	CUGAUGAG	X	CGAA	IGGAACGU	2388
1081	UCCCCAAC	C	UCUUCUCC	614	GGAGAAGA	CUGAUGAG	X	CGAA	IUUGGGAA	2389
1082	UCCCCAAC	U	CUUCUCCC	615	GGGAGAAG	CUGAUGAG	X	CGAA	IGUUGGGA	2390
1084	CCAACUUC	U	UCUCCUUG	616	CAGGGAGA	CUGAUGAG	X	CGAA	IAGGUUGG	2391
1087	ACCUCUUC	U	CCUCGAG	617	CUGCAGGG	CUGAUGAG	X	CGAA	IAAGAGGU	2392
1089	CUCUUCUC	C	CUGCAGCU	618	AGCUGCAG	CUGAUGAG	X	CGAA	IAGAAGAG	2393
1090	UCUUCUCC	C	UGCAGCUU	619	AAGCUGCA	CUGAUGAG	X	CGAA	IGAGAAGA	2394
1091	CUUCUCCC	U	GCAAGCUU	620	AAAGCUGC	CUGAUGAG	X	CGAA	IGGAGAAG	2395
1094	CUCUUCGC	A	GCUUUGUG	621	CACAAAGC	CUGAUGAG	X	CGAA	ICAGGGAG	2396
1097	CCUGCAGC	U	UUGUGGUG	622	CACCACAA	CUGAUGAG	X	CGAA	ICUGCAGG	2397
1107	UUGUGUCC	U	GGCUUCCC	623	GGGAAGCC	CUGAUGAG	X	CGAA	ICGACACA	2398
1111	GUGCUGGC	U	UCCCCUCC	624	GAGGGGGA	CUGAUGAG	X	CGAA	ICGACGAC	2399
1114	CUGCUCUC	C	CCUCACAC	625	GUUGAGGG	CUGAUGAG	X	CGAA	IAGGCCAG	2400
1115	UGGCUUCC	C	CCUCAACC	626	GGUUGAGG	CUGAUGAG	X	CGAA	IGAAGCCA	2401
1116	GGCUUCCC	C	CUCAACCA	627	UGGUUGAG	CUGAUGAG	X	CGAA	IGGAAGCC	2402
1117	CUUCCCCC	C	UCAAACAG	628	CUGGUUGA	CUGAUGAG	X	CGAA	IGGGAAGC	2403
1118	CUUCCCCC	U	CAACAGAU	629	ACUGGUUG	CUGAUGAG	X	CGAA	IGGGGAAG	2404
1120	UCCCCUCC	A	ACCAAGUC	630	AGACUGGU	CUGAUGAG	X	CGAA	IAGGGGGA	2405
1123	CCUCACAC	C	AGUCUGAA	631	UUCAGACU	CUGAUGAG	X	CGAA	IUUGAGGG	2406
1124	CCUCACAC	A	GUCUGAAG	632	CUUCAGAC	CUGAUGAG	X	CGAA	IGUUGAGG	2407
1128	AACCAUGC	U	GAAGUCUC	633	AGCACUUC	CUGAUGAG	X	CGAA	IACUGGUU	2408
1136	UGAAGUUC	U	GGCCUCUG	634	CAGAGGCC	CUGAUGAG	X	CGAA	ICAUUCCA	2409
1140	GUGCUGGC	C	UCUGUCGG	635	CCGACAGA	CUGAUGAG	X	CGAA	ICGACGAC	2410
1141	UGCUGGCC	U	CUGUGCGA	636	UCCGACAG	CUGAUGAG	X	CGAA	IGCCAGCA	2411
1143	CUGGCGUC	U	GUCGAGGS	637	CCUCCGAC	CUGAUGAG	X	CGAA	IAGGCCAG	2412

Table 19

1156	GAGGAGC A UGAUCAU	638	AAUGAUCA CUGAUGAG X CGAA ICUCUCCUC	2413
1162	GCAUGAUC A UUGGAGGU	639	ACCUCCAA CUGAUGAG X CGAA IAUCAUGC	2414
1177	GUUAUCGAC C ACUCGUG	640	CAGCGAG CUGAUGAG X CGAA IUCGAUAC	2415
1178	UAUCGACC A CUCGUGU	641	ACAGCGAG CUGAUGAG X CGAA IGUGGAUA	2416
1180	UCGACCAU U CGUGUAC	642	GUACAGCG CUGAUGAG X CGAA IUGGUCAU	2417
1184	CCACUCGCG U GUACACAG	643	CUGUGUAC CUGAUGAG X CGAA ICGAGUGG	2418
1189	CCGUGUAC A CAGGACAGU	644	ACUGCCUG CUGAUGAG X CGAA IUACACGG	2419
1191	CUGUACAC A GGCAGUCU	645	AGACUGCC CUGAUGAG X CGAA IUGUAUAC	2420
1195	ACACAGGC A GUCUCUGG	646	CCAGAGAC CUGAUGAG X CGAA ICCUGUGU	2421
1199	AGGCAUUC U CUGGUUA	647	UAUACCAU CUGAUGAG X CGAA IACUGCCU	2422
1201	GCAGUCU U GGUUAACA	648	UGUAUACC CUGAUGAG X CGAA IAGACUGC	2423
1209	UGUAUAC A CCAUCCG	649	CGGAUUGG CUGAUGAG X CGAA IUADACCA	2424
1211	GUUAUACAC C CAUCCGGC	650	GCAGGAUG CUGAUGAG X CGAA IUGUAUAC	2425
1212	UAUACACC C AUCCGGG	651	CGCCGGAU CUGAUGAG X CGAA IGUGUAUA	2426
1213	AUACACCC A UCCGGCG	652	CCGCCGGA CUGAUGAG X CGAA ICGUGUAU	2427
1216	CACCCAU C GCGGGGAG	653	CUCCCGCC CUGAUGAG X CGAA IAUUGGUG	2428
1243	AGGUGAUC A UUGUGCG	654	CCGCACAA CUGAUGAG X CGAA IUAUACCU	2429
1261	UGGAGAU C AUCCAGAC	655	CUGUCCAU CUGAUGAG X CGAA IAUUCCA	2430
1268	CAUUGAC A GGAUCUGA	656	UCAGAUCC CUGAUGAG X CGAA IUCCAUG	2431
1274	ACAGAUUC U GAUAUUG	657	CCAUAUUC CUGAUGAG X CGAA IAUCCUGU	2432
1285	AAUUGAC U GCAAGGAG	658	CUCCUUGC CUGAUGAG X CGAA IUCCAUAU	2433
1288	UGGACUCC A AGGAGUAC	659	GUACUCCU CUGAUGAG X CGAA IUAUCCA	2434
1297	AGGAGUAC A ACUAUAGC	660	GUCAUAGU CUGAUGAG X CGAA IUAUCCU	2435
1300	AGUAUAC U AUGACAAG	661	CUUGUCAU CUGAUGAG X CGAA IUUGUAU	2436
1306	ACUAUAGC A AGAGCAU	662	AAUGCUCU CUGAUGAG X CGAA IUAUAGU	2437
1312	ACAAGAGC A UUGUGGAC	663	GUCCACAA CUGAUGAG X CGAA ICUCUUGU	2438
1321	UUGUGGAC A UUGGCACC	664	GGUGCCAC CUGAUGAG X CGAA IUCCACAA	2439
1327	ACAGUGGC A CCACCAAC	665	GUUGGUGG CUGAUGAG X CGAA ICCACUGU	2440
1329	AUUGGCAC C ACCAACCU	666	AGGUUGGU CUGAUGAG X CGAA IUGGCCAC	2441
1330	GUGGCACC A CCAACCUU	667	AAGGUUGG CUGAUGAG X CGAA IUGGCCAC	2442
1332	GGCACACC C AACCUUGC	668	CGAAGGUU CUGAUGAG X CGAA IUGGUGCC	2443
1333	GCACCAAC A ACCUUGU	669	ACGAAGGU CUGAUGAG X CGAA IUGGUGCC	2444
1336	CCACCAAC C UUCGUUGU	670	CAAAACGA CUGAUGAG X CGAA IUUGGUGG	2445
1337	CACCAACC U UCGUUGU	671	GCAAAACGA CUGAUGAG X CGAA IUGUGGUG	2446
1346	UCGUUGC C CAAGAAG	672	CUUUCUUG CUGAUGAG X CGAA ICANACGA	2447
1347	CGUUGCC C AAGAAGU	673	ACUUCUUG CUGAUGAG X CGAA IGCAAAAC	2448
1348	GUUUGCCC A AGAAAGU	674	CACUUCUUG CUGAUGAG X CGAA IGGCAAA	2449
1365	UUGAAGC U GCAUCAA	675	UUGACUCC CUGAUGAG X CGAA ICUUCAA	2450
1368	GAAGCUGC A GUCAAU	676	GAUUGAC CUGAUGAG X CGAA ICAUCUUC	2451
1372	UCGCAUC A AAUCAUC	677	GAUGGAU CUGAUGAG X CGAA IACUGGAC	2452
1377	GUCAAUUC C AUCAAGGC	678	GCCUUGAU CUGAUGAG X CGAA IAUUGAC	2453
1378	UCAAUUC A UCAAGCA	679	UGCCUUGA CUGAUGAG X CGAA IGAUUGA	2454
1381	AAUCCAUC A AGGCAGCC	680	GGCUGCCU CUGAUGAG X CGAA IAUUGAU	2455
1386	AUCAAGGC A GCUCCUC	681	GAGGAGGC CUGAUGAG X CGAA ICCUUGAU	2456
1389	AAGGCAGC C UCUCCAC	682	GUGGAAGA CUGAUGAG X CGAA ICUGCCU	2457
1390	AGGCAGCC U CCACACG	683	CGUGGAGC CUGAUGAG X CGAA ICUGCCU	2458
1392	GCAGCCUC C UCCACGA	684	UCCUGGA CUGAUGAG X CGAA IAGGUGC	2459
1393	CAGCCUC C CCACGAG	685	CUCCUGG CUGAUGAG X CGAA IAGGUGC	2460
1395	GCCUCCUC C ACAGAGAA	686	UUCUCCUG CUGAUGAG X CGAA IAGGAGG	2461
1396	CCUCCUC C CGAGAG	687	CUUCCUG CUGAUGAG X CGAA IAGGAGG	2462
1408	AGAAGUUC C CUGAGGU	688	ACCAUAC CUGAUGAG X CGAA IAAUUCU	2463

Table 19

1409	GAAGUCC C UGAUGGU	689	AACCAUCA CUGAUGAG X CGAA IGAACUUC	2464
1410	AAGUCC C UGAUGGU	690	AAACCAUC CUGAUGAG X CGAA IGAACUUC	2465
1420	AUGGUUC U GGUAGGA	691	UCCUAGCC CUGAUGAG X CGAA IAAACUUC	2466
1424	UUUCUGG U AGGAGAG	692	GCUCUCC CUGAUGAG X CGAA ICCAGAAA	2467
1433	AGGAGAG C GCUUGGU	693	ACACCAAG CUGAUGAG X CGAA ICUCUCCU	2468
1436	AGAGGAG C GGUUGGU	694	AGCACAC CUGAUGAG X CGAA ICUCUCCU	2469
1444	UGGUGGC U GGAAGCA	695	UGCUUCC CUGAUGAG X CGAA ICACACCA	2470
1448	GUGCUGC A AGCAGCA	696	UGCCUGC CUGAUGAG X CGAA ICCAGCAC	2471
1452	GUGCAGC A GGCACCA	697	GUGGUGC CUGAUGAG X CGAA ICUGCCCA	2472
1456	AAGCAGC A CACCCU	698	AGGGUGG CUGAUGAG X CGAA ICUGCUCU	2473
1458	GCAAGC C ACCCCU	699	CAAGGGU CUGAUGAG X CGAA IUCCUGC	2474
1459	CAGGACC A CCCCUGG	700	CCAAGGG CUGAUGAG X CGAA IUGGCCUG	2475
1461	GGCACC C CCUUGGA	701	UUCCAAG CUGAUGAG X CGAA IUGGUGCC	2476
1462	GACCAAC C CUUGAAC	702	GUCCAG CUGAUGAG X CGAA IUGGUGCC	2477
1463	CACCAAC C UUUGAAC	703	UUUCCA CUGAUGAG X CGAA IUGGUGCC	2478
1464	ACCACCC U UGGAACU	704	AGUCCA CUGAUGAG X CGAA IUGGUGU	2479
1471	CUUGAAC A UUUCUCA	705	UGGAAAA CUGAUGAG X CGAA IUUCCAAG	2480
1477	ACAUUUC C CAGUACU	706	GAGCAG CUGAUGAG X CGAA IAAAUUGU	2481
1478	CAUUUCC C AGUCAUC	707	AGAUGA CUGAUGAG X CGAA IGAAAUUG	2482
1479	AUUUCCC A GUCAUC	708	GAGUAG CUGAUGAG X CGAA IGGAAAUU	2483
1483	UCCAGUC A UCUCAC	709	GAGUGA CUGAUGAG X CGAA IACUGGA	2484
1486	CAGUAC U CACUAC	710	GUAGAG CUGAUGAG X CGAA IAGUAGU	2485
1488	GUCAUC C CUUACU	711	AGGUAG CUGAUGAG X CGAA IAGUAGU	2486
1490	CAUCUCC C GCUUAA	712	UUGGUA CUGAUGAG X CGAA IAGUAGU	2487
1492	UCUACUC U ACUUAU	713	CAUUAU CUGAUGAG X CGAA IAGUAGU	2488
1495	CACUAC C UAAUGGU	714	ACCCAU CUGAUGAG X CGAA IAGUAGU	2489
1496	ACUCUAC U AAUGGU	715	CACCAU CUGAUGAG X CGAA IAGUAGU	2490
1512	GAGUAC C AACAGUC	716	GACUGU CUGAUGAG X CGAA IUAACUUC	2491
1513	AGGUUAC C ACCAGUC	717	GGACUGU CUGAUGAG X CGAA IUAACUUC	2492
1516	UAACCA C AGUCCU	718	GAAGGAC CUGAUGAG X CGAA IUUGGUA	2493
1517	UAACCA C GUCCU	719	GAAGGAC CUGAUGAG X CGAA IUUGGUA	2494
1521	AACAGUC C UUCGCAU	720	AUGCGAA CUGAUGAG X CGAA IACUGGU	2495
1522	ACCAGUC U UCGCAU	721	GAGCGGA CUGAUGAG X CGAA IACUGGU	2496
1525	AGUCCU C GCAUACC	722	GGUGAUC CUGAUGAG X CGAA IAGGAGU	2497
1528	CUUCCG C UACCAUC	723	GAGGUGA CUGAUGAG X CGAA ICGGAAGG	2498
1531	UCGCAUC C CAUCCU	724	AAGGAUG CUGAUGAG X CGAA IAUCCGA	2499
1533	CGCAUC C AUCCU	725	GGAGGAU CUGAUGAG X CGAA IUAUGCG	2500
1534	GCAUACC C UCCUUG	726	CGGAAGA CUGAUGAG X CGAA IUGGAGC	2501
1537	CGCAUAC C UCCGAG	727	CUCCGGA CUGAUGAG X CGAA IUAUGGA	2502
1538	CACCAUC U UCGCAG	728	CGUCGGA CUGAUGAG X CGAA IUAUGGU	2503
1541	CAUCCU C GCAGCAU	729	AUUCUG CUGAUGAG X CGAA IAAUGAU	2504
1544	CUUCCG C GCAUACC	730	GGUAUUC CUGAUGAG X CGAA ICGGAAGG	2505
1547	UCCGAG C AUACUC	731	CGAGGUA CUGAUGAG X CGAA IUCGCGA	2506
1552	AGCAUAC C UCGGCA	732	UGGCGCA CUGAUGAG X CGAA IUAUGGU	2507
1553	GCAUACC U GCGGCA	733	CUCCGCG CUGAUGAG X CGAA IUAUGGU	2508
1559	CUCCGCG C AGUGAAG	734	CUCCGCG CUGAUGAG X CGAA ICGGAGG	2509
1560	CUCCGCG C GUGAAGA	735	UCUCCAC CUGAUGAG X CGAA ICGGAGG	2510
1575	GAGUUG C ACUCUCA	736	UGGAGGU CUGAUGAG X CGAA ICCACAU	2511
1576	AUGGUG C CUUCCCA	737	UUGGAG CUGAUGAG X CGAA ICCACAU	2512
1581	GCCAGUC C CAAGACA	738	UCGUUC CUGAUGAG X CGAA IACUGGC	2513
1582	CCAGUC C AAGACAG	739	GUCGUUC CUGAUGAG X CGAA IACUGGC	2514

Table 19

1583	CACGUGCC	A	AGACGACU	740	AGUGGUCU	CUGAUGAG	X	CGAA	IGGACGUG	2515
1591	AAGACGAC	U	GUUACAA	741	CUUGUAC	CUGAUGAG	X	CGAA	IUGUGUCU	2516
1597	ACUGUAC	A	AGUUGCC	742	GGCAACU	CUGAUGAG	X	CGAA	IUAACAGU	2517
1605	AAGUUGGC	C	AUCUCACA	743	UGUGAGAU	CUGAUGAG	X	CGAA	ICAAACUU	2518
1606	AGUUGGCC	A	UCUCACAG	744	CUGUGAGA	CUGAUGAG	X	CGAA	IGCAAAUC	2519
1609	UUGCCCAU	U	CACAGUCA	745	UGACUUGU	CUGAUGAG	X	CGAA	IAUGGCCA	2520
1611	GCCAUUC	A	CAGUCAUC	746	GAUGACUG	CUGAUGAG	X	CGAA	IAGAUUGC	2521
1613	CAUCUCAC	A	GUAUCA	747	UGGAGAC	CUGAUGAG	X	CGAA	IUGAGAUU	2522
1617	UACACAGC	A	UCCAAGG	748	CCGUGGA	CUGAUGAG	X	CGAA	ICUGUGA	2523
1620	CAGUCAUC	C	ACGAGCAC	749	GUGCCGUG	CUGAUGAG	X	CGAA	IAUGACUG	2524
1621	AGUCAUCC	A	CGGACAU	750	AGUGCCG	CUGAUGAG	X	CGAA	IUGAUGU	2525
1627	CCACGGGC	A	CUGUUAUG	751	CAUAAAC	CUGAUGAG	X	CGAA	ICCCGUGG	2526
1629	ACGGGCAC	U	GUUAUGG	752	CCCAUAC	CUGAUGAG	X	CGAA	IUGCCGUG	2527
1641	UUGGAGC	U	GUUAUCAU	753	AGUUAAC	CUGAUGAG	X	CGAA	ICUCCCAU	2528
1648	CUGUUAUC	A	UGGAGGCG	754	GCCUCCA	CUGAUGAG	X	CGAA	IAUAACAG	2529
1657	UGGAGGCG	U	UCUACGUU	755	AACGUA	CUGAUGAG	X	CGAA	ICCCUCCA	2530
1660	AGGGCUUC	U	ACGUUGUC	756	GACAACU	CUGAUGAG	X	CGAA	IAGCCCUU	2531
1669	ACGUUGUC	U	UGUAUGG	757	CCGAUAA	CUGAUGAG	X	CGAA	IACAAAGU	2532
1680	GAUGGGGC	C	CGAAACG	758	CGUUGUG	CUGAUGAG	X	CGAA	ICCCGUAU	2533
1681	AUGGGGCC	C	GAUAAAG	759	UCGUUUC	CUGAUGAG	X	CGAA	IGCCCGAU	2534
1696	GAUUGGC	U	UUGUGUC	760	GACAGCA	CUGAUGAG	X	CGAA	ICCAUUC	2535
1701	GGCUUGUC	U	GUCAGCG	761	GCGUGAC	CUGAUGAG	X	CGAA	ICAAAGCC	2536
1705	UUGUGUC	A	GCGUGUC	762	GCAAGCG	CUGAUGAG	X	CGAA	IACAGCAA	2537
1710	GUCAGCG	C	UGCAUGU	763	ACAUGGA	CUGAUGAG	X	CGAA	IACGCGAC	2538
1714	GCGUGGC	C	AUGUGCAC	764	GUGCACA	CUGAUGAG	X	CGAA	ICAAAGCG	2539
1715	GCGUGGC	A	UGUGCAC	765	CGUGACA	CUGAUGAG	X	CGAA	IGCAAGCG	2540
1721	CCAUUGGC	A	CGAUGAGU	766	ACUCAUG	CUGAUGAG	X	CGAA	IACAUGG	2541
1732	AUGAGUUC	A	GGACGGCA	767	UGCCGUC	CUGAUGAG	X	CGAA	IACAUCAU	2542
1740	AGGACGGC	A	GCGGUGGA	768	UCCACCG	CUGAUGAG	X	CGAA	ICCGUCCU	2543
1753	UGGAAGGC	C	UUUUGUC	769	GACAAAG	CUGAUGAG	X	CGAA	ICCUUCCA	2544
1754	GGAAGGCC	C	UUUUGUCA	770	UGACAAA	CUGAUGAG	X	CGAA	IGCCUCC	2545
1755	GAAGGCC	U	UUUGUCAC	771	GUGACAA	CUGAUGAG	X	CGAA	IGCCCUUC	2546
1762	UUUUGUC	A	CCUUGGAC	772	GUCCAAG	CUGAUGAG	X	CGAA	IACAAAAG	2547
1764	UUUUGUC	A	UGGACAU	773	AUGUCAA	CUGAUGAG	X	CGAA	IUGACAAA	2548
1765	UUGUACCC	U	UGGACAU	774	CAUGUCCA	CUGAUGAG	X	CGAA	IUGACAAA	2549
1771	CCUUGGAC	A	UGGAAGAC	775	GUCUCCA	CUGAUGAG	X	CGAA	IUGCAAGG	2550
1780	UUGAAGAC	U	GUGGUCAC	776	GUAGCAC	CUGAUGAG	X	CGAA	IUCUCCA	2551
1786	ACUGUGGC	U	ACAACAU	777	AUUGUGU	CUGAUGAG	X	CGAA	ICCAAGU	2552
1789	GUGGUCAC	A	CAUUGCCA	778	UGGAUUG	CUGAUGAG	X	CGAA	IUAGCCAC	2553
1792	GUUACAC	A	UUGACAG	779	CUGUGAA	CUGAUGAG	X	CGAA	IUGUGAG	2554
1796	CAACAUC	C	ACAGACAG	780	CUGUGUG	CUGAUGAG	X	CGAA	IUAUGUG	2555
1797	AACAUC	C	CAGACAGA	781	UCUGUGU	CUGAUGAG	X	CGAA	IUAUGUG	2556
1799	CAUCCAC	A	GACAGAG	782	CAUCUGU	CUGAUGAG	X	CGAA	IUGAUGU	2557
1803	CCACAGAC	A	GAUGAGUC	783	GACUACU	CUGAUGAG	X	CGAA	IUCUGUG	2558
1812	GAUGAGUC	A	ACCCUCAU	784	AUGAGGUG	CUGAUGAG	X	CGAA	IACUCAU	2559
1815	GAGUACAC	C	CUCAUGAC	785	GUCAUGAG	CUGAUGAG	X	CGAA	IUTGACUC	2560
1816	AGUCAACC	C	UCAUGACC	786	GGUCAUGA	CUGAUGAG	X	CGAA	IUGUGACU	2561
1817	GUCAACCC	U	CAUGACCA	787	UGGUAUG	CUGAUGAG	X	CGAA	IUGUGAC	2562
1819	CAACCCU	A	UGACCAUA	788	UAUGGUGA	CUGAUGAG	X	CGAA	IAGGUGUG	2563
1824	CUCAUGAC	C	AUAGCCUA	789	UAGGCUAU	CUGAUGAG	X	CGAA	IUCUAG	2564
1825	UCAUGACC	A	UAGCCUAU	790	AUAGGCUA	CUGAUGAG	X	CGAA	IUGAUGA	2565

Table 19

1830	ACCAUJAGC	U	UAUGUCAU	791	AUGACAUA	CUGAUGAG	X	CGAA	ICUAUGGU	2566
1831	CCAUAJGC	U	UAUGUCAU	792	CAUGACAU	CUGAUGAG	X	CGAA	ICUAUGGU	2567
1837	CCUAUGUC	A	UGGCGGCC	793	GGCAGCCA	CUGAUGAG	X	CGAA	IACAUAAG	2568
1842	GUCAUGGC	U	GCCAUCUG	794	CAGAUGGC	CUGAUGAG	X	CGAA	ICCAUGAC	2569
1845	AUGGUGGC	C	AUCUGGCG	795	GGCAGAU	CUGAUGAG	X	CGAA	ICGACCAU	2570
1846	UGGUGGCC	A	UCUGGCC	796	GGCGAGA	CUGAUGAG	X	CGAA	ICGACCAU	2571
1849	CUGCCAUC	U	GCGGCCUC	797	GAGGCGC	CUGAUGAG	X	CGAA	IAUGGCG	2572
1854	AUCUGGCG	C	CUCUJCAU	798	AUGAAGAG	CUGAUGAG	X	CGAA	ICGACCAU	2573
1855	UGGUGGCC	C	UCUUGAUG	799	CAUGAAGA	CUGAUGAG	X	CGAA	ICGACCAU	2574
1856	CUGGCGCC	U	CUCUJCAU	800	GCAUGAA	CUGAUGAG	X	CGAA	IGGCGCAG	2575
1858	GCGGCCUC	U	UAUGUCAU	801	CAGCAUGA	CUGAUGAG	X	CGAA	IAUGGCG	2576
1861	CCUCUCUC	A	UGGUGCCA	802	UGGCGAGA	CUGAUGAG	X	CGAA	IAAGAGGG	2577
1865	CUCUJCAU	U	GCCAUCUC	803	AGAGUGGC	CUGAUGAG	X	CGAA	ICUAUGAG	2578
1868	CAUGUGGC	C	ACUCUGCC	804	GGCAGAGU	CUGAUGAG	X	CGAA	ICAGCAAG	2579
1869	AUGUGGC	A	CUCUGCCU	805	AGGAGAGU	CUGAUGAG	X	CGAA	ICGACCAU	2580
1871	GCUGCCAC	U	CUGCCUCA	806	UGAGGCG	CUGAUGAG	X	CGAA	IUGGCGC	2581
1873	UGCCACUC	U	GCCUCAUG	807	CAUGAGGC	CUGAUGAG	X	CGAA	IAUGGCG	2582
1876	CACUCUGC	C	UCAUGGUG	808	CACCAUGA	CUGAUGAG	X	CGAA	ICAGAGUG	2583
1877	ACUCUGCC	U	CAUGGUGU	809	ACCAUGAG	CUGAUGAG	X	CGAA	ICAGAGUG	2584
1879	UCUGCCUC	A	UGGUGUGU	810	ACACACCA	CUGAUGAG	X	CGAA	IAAGCAAG	2585
1889	AGUGUGUC	A	UGGUGGUC	811	AGCGCCAC	CUGAUGAG	X	CGAA	IACACAC	2586
1897	GUUGGCGC	U	GCCUGGCG	812	GCGGAGGC	CUGAUGAG	X	CGAA	ICGCGACU	2587
1900	GCGCUGGC	C	UCGCGUGC	813	GCGAGGGA	CUGAUGAG	X	CGAA	ICAGCGCC	2588
1901	GCGCUGGC	C	ACUCUGCC	814	GCGAGGCG	CUGAUGAG	X	CGAA	ICGAGCGC	2589
1903	GCUGCCUC	C	GCUGGUG	815	CAGGAGGC	CUGAUGAG	X	CGAA	IAAGGCGC	2590
1906	GCCUCGCG	U	GCCUGGCG	816	GCGCAGGC	CUGAUGAG	X	CGAA	ICGAGGCG	2591
1909	UCGCGUGC	C	UGCGCCAG	817	CUGGCGCA	CUGAUGAG	X	CGAA	ICAGCGGA	2592
1910	CCGUGGCC	U	GCGCCAGC	818	GCUGGCGC	CUGAUGAG	X	CGAA	ICGAGGCG	2593
1915	GCCUGGCG	C	AGCAGCAU	819	AUGGUGUC	CUGAUGAG	X	CGAA	ICGAGGCG	2594
1916	CCUGGCGC	A	GCAUGAUG	820	CAUGGUGC	CUGAUGAG	X	CGAA	ICGAGGCG	2595
1919	GCGCCAGC	A	GCAUGAUG	821	CAUGGUGC	CUGAUGAG	X	CGAA	ICGAGGCG	2596
1922	CCAGCAGC	A	UGAUGACU	822	AGUCAUCA	CUGAUGAG	X	CGAA	ICGAGGCG	2597
1930	AUGAUGAC	U	UGGUGAUG	823	AUCAGCAA	CUGAUGAG	X	CGAA	IUCAUCAU	2598
1935	GACUUGGC	U	GAUGACAU	824	AUGUCAUC	CUGAUGAG	X	CGAA	ICAAAGUC	2599
1942	CUGAUGAC	A	UCUCCUG	825	CAGGAGGA	CUGAUGAG	X	CGAA	IUCAUCAU	2600
1945	AUGACAUC	U	CCUUGGUG	826	CAGCAGGC	CUGAUGAG	X	CGAA	IAUGUCAU	2601
1947	GACAUCUC	C	CUGUGGAA	827	UUCAGCAG	CUGAUGAG	X	CGAA	IAGAGGUC	2602
1948	ACAUCUCC	C	UGGUGAAG	828	CUCAGGCA	CUGAUGAG	X	CGAA	IAGAGGUG	2603
1949	CAUCUCCU	U	GCUGAAGU	829	ACUUCAGC	CUGAUGAG	X	CGAA	ICGAGGUG	2604
1952	CUCUUGGC	U	GAUGGAG	830	CUCACUUC	CUGAUGAG	X	CGAA	ICAGGAGG	2605
1966	GAGGAGGC	C	CAUGGGCA	831	UGCCCAUG	CUGAUGAG	X	CGAA	ICCUCCUC	2606
1967	AGGAGGCC	C	AUGGGGCA	832	CUGCCCAU	CUGAUGAG	X	CGAA	ICGUCUCU	2607
1968	GAGGCGCC	A	UGGCGAGA	833	UCUGCCCA	CUGAUGAG	X	CGAA	IGGCGUCU	2608
1974	CAUGGAGC	A	GAAGAGAG	834	CUAUCUCU	CUGAUGAG	X	CGAA	ICCCAGUG	2609
1989	AGAGAUUC	C	CCUGGACC	835	GGUCCAGG	CUGAUGAG	X	CGAA	IAAUUCUC	2610
1990	GAGAUUCC	C	CUGGACCA	836	UGGUCCAG	CUGAUGAG	X	CGAA	IGAAUUCU	2611
1991	AGAUUCCC	C	UGGACCCAG	837	GUGGUCAG	CUGAUGAG	X	CGAA	IGGAAUUC	2612
1992	GAUUGCCC	U	GGACCCAG	838	UGUGGUCG	CUGAUGAG	X	CGAA	IGGAAUUC	2613
1997	CCUUGGAC	C	ACACUCC	839	GGAGGUGU	CUGAUGAG	X	CGAA	IUCCAGGG	2614
1998	CCUGGACC	A	CACUCCG	840	CGAGGUGU	CUGAUGAG	X	CGAA	IUGGACAG	2615
2000	UGGACCCAG	A	CCUCUGG	841	CACGGAGG	CUGAUGAG	X	CGAA	IUGGACCA	2616

Table 19

2002	GACCACAC	C	UCCGUGGU	842	ACCACGGA	CUGAUGAG	X	CGAA	IUGUGGUC	2617
2003	ACCACACC	U	CCGUGGUU	843	AACCACGG	CUGAUGAG	X	CGAA	IUGUGGUU	2618
2005	CACACCUC	C	GUGGUUCA	844	UGAACCCAC	CUGAUGAG	X	CGAA	IAGUGUGU	2619
2013	CGUGGUUC	A	CUUUGGUC	845	GACCAAAG	CUGAUGAG	X	CGAA	TAACCAAG	2620
2015	UGGUUACU	U	UUGGUAC	846	GUGACCAA	CUGAUGAG	X	CGAA	TUGAACCA	2621
2022	CUUUGGUC	A	CAAGUAGG	847	CCUACUUG	CUGAUGAG	X	CGAA	IACCAAAG	2622
2024	UUGGUACU	A	AGUAGGAG	848	CUCCUACU	CUGAUGAG	X	CGAA	TUGACCAA	2623
2035	UAGGAGAC	A	CAGAUUGC	849	GCCAUUCG	CUGAUGAG	X	CGAA	IUCUCCUA	2624
2037	GGAGACAC	A	GAUGGCAC	850	GUGCCAUC	CUGAUGAG	X	CGAA	IUGUUCUC	2625
2044	CAGAUUGC	A	CCUGGGC	851	GCCACAGG	CUGAUGAG	X	CGAA	TCCAUUCG	2626
2046	GAUGGCAC	C	UGUGGCCA	852	UGGCCACA	CUGAUGAG	X	CGAA	IUGCCAUC	2627
2047	AUGGCACC	U	GUUGCCAG	853	CUGGCCAC	CUGAUGAG	X	CGAA	IUGGCCAU	2628
2053	CCUGGGC	C	AGAGCAC	854	GGUGUCU	CUGAUGAG	X	CGAA	ICCACAGG	2629
2054	CUGUGGCC	A	GAGCACCU	855	AGUGGUCU	CUGAUGAG	X	CGAA	IGCCACAG	2630
2059	GCCAGAGC	A	CCUACAGG	856	UCCUGAGG	CUGAUGAG	X	CGAA	ICUCUGGC	2631
2061	CAGAGCAC	C	UCAGGACC	857	GGUCCUGU	CUGAUGAG	X	CGAA	IUGUCUCU	2632
2062	AGAGCAC	U	CAGGACCC	858	GGGUCCUG	CUGAUGAG	X	CGAA	IUGUCUCU	2633
2064	AGCACCU	A	GGACCCUC	859	GAGGUUCC	CUGAUGAG	X	CGAA	IAGUGUCU	2634
2069	CUCAGGAC	C	CUCCCCAC	860	GUGGGGAG	CUGAUGAG	X	CGAA	IUCUCUG	2635
2070	UCAGGACC	C	UCCCCACC	861	GGUGGGGA	CUGAUGAG	X	CGAA	IGUCCUGA	2636
2071	CAGGACCC	U	CCCCACCC	862	GGUGGGGG	CUGAUGAG	X	CGAA	IUGUCCUG	2637
2073	GGACCCUC	C	CCACCCAC	863	GUGGGUGG	CUGAUGAG	X	CGAA	IAGGGUCC	2638
2074	GACCCUCC	C	CACCCACC	864	GGUGGGUG	CUGAUGAG	X	CGAA	IAGGGUCC	2639
2075	ACCCUCCC	C	ACCCACCA	865	UGGUUGGU	CUGAUGAG	X	CGAA	IGAGGGU	2640
2076	CCUCCCC	A	CCACACAA	866	UUGUGGGG	CUGAUGAG	X	CGAA	IGGAGGG	2641
2078	CUCCCCAC	C	CACCAAUU	867	AUUUGGUG	CUGAUGAG	X	CGAA	IUGGGAG	2642
2079	UCCCCACC	C	ACCAAAUG	868	CAUUGGUU	CUGAUGAG	X	CGAA	IUGGGGGA	2643
2080	CCCCACCC	A	CCAAAUUC	869	GCAUUUGG	CUGAUGAG	X	CGAA	IUGGGGG	2644
2082	CCACCCAC	C	AAAUUGCU	870	AGGCAUUU	CUGAUGAG	X	CGAA	IUGGGUGG	2645
2083	CACCCACC	A	AAUGCCUC	871	GAGGCAUU	CUGAUGAG	X	CGAA	IUGGGGUU	2646
2089	CCAAAUUC	C	UCUGCCUU	872	AAGGCAGA	CUGAUGAG	X	CGAA	ICAUUUGG	2647
2090	CAAAUGCC	U	CUGCCUUG	873	CAAGGCAG	CUGAUGAG	X	CGAA	IGCAUUG	2648
2092	AAUGCCUC	U	GCUCUAGU	874	AUCAAGGC	CUGAUGAG	X	CGAA	IAGGCAUU	2649
2095	GCCUCUGC	C	UUGAUGGA	875	UCCAUCAA	CUGAUGAG	X	CGAA	ICAGAGGC	2650
2096	CCUUGGCC	U	UGAUGGAG	876	CUCCAUCA	CUGAUGAG	X	CGAA	IGCAGAGG	2651
2116	GAAAGGCG	U	GGCAAGGU	877	ACCUUGCC	CUGAUGAG	X	CGAA	ICCUUUUC	2652
2120	AGGUUGGC	A	AGUGGGU	878	ACCCACCU	CUGAUGAG	X	CGAA	IAGACCU	2653
2131	GUGGUUUC	C	AGGACUG	879	CAGUCCCU	CUGAUGAG	X	CGAA	IAACCCAC	2654
2132	UGGUUUCC	A	GGGACUGU	880	ACAGUCCC	CUGAUGAG	X	CGAA	IGAACCCA	2655
2138	CCAGGGAC	U	GUACCCUG	881	ACAGGUAC	CUGAUGAG	X	CGAA	IUCUCCUG	2656
2143	GACUGUAC	C	UGUAGGAA	882	UUCCUACA	CUGAUGAG	X	CGAA	IUAACAGU	2657
2144	ACUGUACC	U	AGGAGAAA	883	UUUCCUAC	CUGAUGAG	X	CGAA	ICAGAGU	2658
2154	UAGGAAAC	A	GAAAGAG	884	CUUUUUUC	CUGAUGAG	X	CGAA	IUUUCCUA	2659
2174	AAAGAGAC	A	CUCUCUG	885	CAGCAGAG	CUGAUGAG	X	CGAA	ICUUCUUU	2660
2176	AGAAGACU	U	CUGCUGGC	886	GCCAGCAG	CUGAUGAG	X	CGAA	IUGUUCUC	2661
2178	AAGCAGUC	U	GCUGGGCG	887	CCGCCACG	CUGAUGAG	X	CGAA	IAGUGUCU	2662
2181	CACUCUCU	U	GGCGGAA	888	UUCCGCCC	CUGAUGAG	X	CGAA	ICAGAGU	2663
2193	GGGAAUAC	U	CUUGGUCA	889	UGACCAAG	CUGAUGAG	X	CGAA	IUAUUCU	2664
2195	GAAUACUC	U	UGGUACCC	890	GGUGACCA	CUGAUGAG	X	CGAA	IAGUUAUC	2665
2201	UCUUGGUC	A	CCUCAAUU	891	AUUUGAGG	CUGAUGAG	X	CGAA	TACCAAGA	2666
2203	UUGGUACU	C	UCAAUUUU	892	AAAUUGGA	CUGAUGAG	X	CGAA	IUGACCAA	2667

Table 19

2204	UGGUCACC U CAAAUUUA	893	UAAAUUUG CUGAUGAG X CGAA IGUGACCA	2668
2206	GUCACCUC A AAUUAAG	894	CUTAAAUU CUGAUGAG X CGAA IAGGUGAC	2669
2226	GGAAAUUC U GCUGUUG	895	CAAGCAGC CUGAUGAG X CGAA IAAUUIUC	2670
2229	AAUUCUGC U GCUUGAAA	896	UUUCAAGC CUGAUGAG X CGAA ICAGAAU	2671
2232	UCUGCUGC U UGAACCU	897	AAGUUAUA CUGAUGAG X CGAA ICAGCAGA	2672
2239	CUUGAUAU U UCAGCCCU	898	AGGGCUGA CUGAUGAG X CGAA IUUUAAG	2673
2242	GAACAUUC A GCCUGAA	899	UUCAAGGC CUGAUGAG X CGAA IAGUUIUC	2674
2245	ACUUCAGC C CUGAACCU	900	AGGUUAGC CUGAUGAG X CGAA ICUGAAGU	2675
2246	CUCUCAGC C UGAACCU	901	AAGUUAUA CUGAUGAG X CGAA IGUGAAG	2676
2247	UUCAGCCC U GAACCUU	902	AAAGGUUC CUGAUGAG X CGAA IGGUGAA	2677
2252	CCUGAAC C UUGUCCA	903	UGGACAAA CUGAUGAG X CGAA IUUCAGGG	2678
2253	CUGAACU C UUGUCCAC	904	GUGGACAA CUGAUGAG X CGAA IUGUAGG	2679
2259	CCUUGUUC C ACCAUUC	905	GGAAUGGU CUGAUGAG X CGAA IACAAAGG	2680
2260	CUUUGUCC A CCAUUCU	906	AGGAAUGG CUGAUGAG X CGAA IGACAAAG	2681
2262	UUGUCCAC C AUUCUUU	907	AAAGGAU CUGAUGAG X CGAA IUGGACAA	2682
2263	UGUCCACC A UUCUUUA	908	UAAAGGAA CUGAUGAG X CGAA IGUGGAGA	2683
2267	CACCAUUC C UUAUAAU	909	AAUUAUAA CUGAUGAG X CGAA IAAUGUG	2684
2268	ACCAUUC C UUAUAAU	910	GAUUAUAA CUGAUGAG X CGAA TGAUUGU	2685
2277	UUAUUUC U CCAACCCA	911	UGGUUGG CUGAUGAG X CGAA IAAUUAU	2686
2279	AAAUUCU C AACCACAA	912	UUUGGUU CUGAUGAG X CGAA IAGAUUU	2687
2280	AAUUCUCC A ACCCAAG	913	CUUUGGU CUGAUGAG X CGAA IGAGAAU	2688
2283	UCUGCAUC C CAAAGUAU	914	AUAUUUG CUGAUGAG X CGAA IUUGGAGA	2689
2284	CUCACACC C AAGUAU	915	AAUAUUU CUGAUGAG X CGAA IGUGUGAG	2690
2285	UCCAACCC A AAGUAU	916	GAUAUUU CUGAUGAG X CGAA IGUUGGA	2691
2294	AAUAUUUC U UCUUUUU	917	AGAAAGA CUGAUGAG X CGAA IAAUAUU	2692
2297	UAUUUUUC U UUUUUAG	918	CUAAGAAA CUGAUGAG X CGAA IAGAUAU	2693
2302	UUUUUUUC U UAGUUUA	919	UGAAACUA CUGAUGAG X CGAA IAAUAGAA	2694
2310	UUAGUUUC A GAAGUACU	920	AGUAUUU CUGAUGAG X CGAA IAAACUA	2695
2318	AGAAGUAC U GGAUAC	921	GUGAUGCC CUGAUGAG X CGAA IUACUUU	2696
2322	GUACUGGC A UCACAGC	922	GGUGUGA CUGAUGAG X CGAA ICCAGUAC	2697
2325	CUGGCAUC A CAGCAGG	923	CCUGGUG CUGAUGAG X CGAA TAUGCCAG	2698
2327	GGCAUAC A CGCAGGU	924	AACCUGG CUGAUGAG X CGAA IUUGUCC	2699
2331	UCACAGC A GGUUACCU	925	AGGUUACC CUGAUGAG X CGAA TCGUGGA	2700
2338	CAGGUAC C UUGGCGU	926	CACGCCAA CUGAUGAG X CGAA IUUACCU	2701
2339	AGGUUACC U UGGCGUG	927	ACACGCCA CUGAUGAG X CGAA IGUAACCU	2702
2351	CGUGUUC C CUGUGUA	928	UACACAG CUGAUGAG X CGAA IACACAG	2703
2352	CGUGUUC C CUGUGUAC	929	GUACACA CUGAUGAG X CGAA ICAAGG	2704
2353	UGUUCUCC U GUGUACC	930	GGUACCA CUGAUGAG X CGAA IGGACCA	2705
2361	UGUGUAC C CUGGCAGA	931	UCUGCAG CUGAUGAG X CGAA IUUACCA	2706
2362	GUGUAC C UGGAGAG	932	CUCUGCA CUGAUGAG X CGAA IGUACCA	2707
2363	UGUACCC U GGCAGAGA	933	UCUCUGC CUGAUGAG X CGAA IGGUACCA	2708
2367	ACCUGUC C GAGAGAG	934	CUCUUC CUGAUGAG X CGAA ICCAGGU	2709
2378	GAAGAGAC C AAGUUU	935	ACAAGCU CUGAUGAG X CGAA IUUCUUC	2710
2379	AAGAGACC A AGCUUGU	936	AACAAGCU CUGAUGAG X CGAA IGUCUUC	2711
2383	GACCAAGC U UGUUUCC	937	GGAAACA CUGAUGAG X CGAA ICUUGUC	2712
2390	CUGUUUC C CUGUGGC	938	GCCAGCAG CUGAUGAG X CGAA IAAACAG	2713
2391	UUGUUUC C UGUGGCC	939	GGCCAGCA CUGAUGAG X CGAA IGAAACA	2714
2392	UGUUUCC U GUGGCCA	940	UGGCCAGC CUGAUGAG X CGAA IGGAAACA	2715
2395	UUCUUGC U GGCAGAG	941	CUUUGGC CUGAUGAG X CGAA TCGGGAA	2716
2399	CUGUGGC C AAGUACG	942	CUGACUU CUGAUGAG X CGAA ICCAGCAG	2717
2400	UGUGGCC C AAGUACG	943	ACUGACU CUGAUGAG X CGAA IGCCAGCA	2718

Table 19

2406	CCAAAGUC A GUAGGAGA	944	UCUCCUAC CUGAUGAG X CGAA IACUUUGG	2719
2421	GAGGAUGC A CAGUUUGC	945	GCAAAACUG CUGAUGAG X CGAA ICAUCCUC	2720
2423	GGAUGCAC A GUUUGCUA	946	UAGCAAAAC CUGAUGAG X CGAA IUGCAUCC	2721
2430	CAGUUUGC U AUUUGCUU	947	AAGCAAAU CUGAUGAG X CGAA ICAAAACUG	2722
2437	CUAUUUGC U UUGAGAGAC	948	GUCUCUAA CUGAUGAG X CGAA ICAAAUAG	2723
2446	UUAGAGAC A GGGACUGU	949	ACAGUCCC CUGAUGAG X CGAA IUCUCUAA	2724
2452	ACAGGGAC U GUUAAAC	950	GUUUUAC CUGAUGAG X CGAA IUCCUGU	2725
2461	GUUAAAC A AGCCUAAAC	951	GUUAGGCU CUGAUGAG X CGAA IUUUUAC	2726
2465	AAACAAGC C UAACAUUG	952	CAUUGUUA CUGAUGAG X CGAA ICUUGUUU	2727
2466	AACAAGCC U AACAUUGG	953	CCAUGUU CUGAUGAG X CGAA IGCUGUU	2728
2470	AGCCUAAAC A UUGGUGCA	954	UGCACCAA CUGAUGAG X CGAA IUUAGGCU	2729
2478	AUUGGUGC A AAGAUUGC	955	GCAUUCU CUGAUGAG X CGAA ICACCAAU	2730
2487	AAGAUGC C UCUGAAU	956	AUUCAGA CUGAUGAG X CGAA ICAUUCU	2731
2488	AGAUUGCC U CUUGAAU	957	AAUUCAG CUGAUGAG X CGAA IGCAUUCU	2732
2490	AUUGCUC U UGAAUUA	958	UUAAUUA CUGAUGAG X CGAA IAGCAAU	2733
2509	AAAAAAAC U AGAAAAA	959	UUUUUUU CUGAUGAG X CGAA IUUUUUU	2734

Input Sequence = AF190725. Cut Site = G/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCGUUAGGC or other stem II)
 AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 20

Table 20: Human BACE G-cleaver Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Ra Seq ID
11	AGCGUCC G CAGCCGCG	960	GCAGGCUU UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2735
18	CGAGGCCC G CCUGGGAG	961	CUCGCGGG UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2736
29	CGAGGAGU G CGAGCGCG	962	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG AGUCCGCG	2737
31	GGAGCUUG G AGCGCGGA	963	UCGCGGCU UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2738
36	UGGAGGCC G CGAGCTGG	964	CCAGGCGG UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2739
38	CGAGGCCG G AGCUUGAU	965	AUCGAGCU UGAUG GCAUGGCAUAUGC GCG GCGGCUUG	2740
58	GGUGGCGU G AGGAGGCA	966	UGGCGGCU UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2741
69	AGCGAAC G CAGCGGCA	967	UGGCGGCU UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2742
75	AGCGAGCC G CAGGAGCC	968	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG AGGCGGCU	2743
94	GAGGCUU G CCGGUGCC	969	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG AGGCGGCU	2744
100	UGGCGGCU G CCGGUGCC	970	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG AGGCGGCU	2745
104	CCGUGGCG G CGGCGGCG	971	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GGAACGUU	2746
106	CUGCGGCG G CGGCGGCG	972	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2747
109	CCGCGGCG G CGGCGGCG	973	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2748
112	GGGCGGCG G CGGCGGCG	974	CCGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2749
116	CGGCGGCG G CGGCGGCG	975	CCGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2750
137	GGGAGGCC G CCAAGCGC	976	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2751
148	ACCGAGCC G CCAAGCGC	977	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2752
153	CCGCGGCG G CCGGCGCG	978	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2753
157	CGGCGGCG G CCGGCGCG	979	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2754
172	CCAGGCGG G CCGGCGCG	980	GGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2755
183	GGGAGGCC G CGGCGGCG	981	AGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2756
185	GGGAGGCC G CGGCGGCG	982	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2757
189	CGGCGGCG G CCGGCGCG	983	CUGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2758
192	CGGCGGCG G CCGGCGCG	984	AGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2759
205	GGGCGGCG G CCGGCGCG	985	CAGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2760
208	UGGCGGCG G CCGGCGCG	986	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2761
213	GGGCGGCG G CCGGCGCG	987	UAGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2762
216	GGGCGGCG G CCGGCGCG	988	CGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2763
250	UGGCGGCG G CCGGCGCG	989	CAGGCGGCG UGAUG GCAUGGCAUAUGC GCG GCGGCGG	2764

Table 20

258	GUUCCUUU G CUUUGGCG	990	CUUACAGG UUAUG GUAUGACUAUUG CGG AGCGAGC	2765
263	CUUUGUUU G CGAUAUC	991	GAGUCCG UUAUG GUAUGACUAUUG CGG AGAGACG	2766
276	UUCUCCUU G ACUGUUC	992	AGAGCGU UUAUG GUAUGACUAUUG CGG AGGOGAG	2767
280	CCUUGACU G GUUUCAC	993	GUAGAGG UUAUG GUAUGACUAUUG CGG GUUCGAG	2768
320	AGGUCUUU G UAGGCCUU	994	AGGUCUU UUAUG GUAUGACUAUUG CGG AGGUCUU	2769
337	GGCGUUU G AUGGCCUU	995	GGGCGUU UUAUG GUAUGACUAUUG CGG AGGAGCG	2770
340	GUUUCUUU G CCCCAG	996	GUUUGGG UUAUG GUAUGACUAUUG CGG AUGACG	2771
360	CUUUCUUU G AGAGGCA	997	UUCUUCU UUAUG GUAUGACUAUUG CGG AGGAGGG	2772
397	GGGAGCG G CGAGGAC	998	GUCUCCG UUAUG GUAUGACUAUUG CGG GCUUCCG	2773
420	GGGCGAGU G CGAGGCCA	999	UGGCGUG UUAUG GUAUGACUAUUG CGG AUGUCCG	2774
422	GCAGUGG G AGCCGAGA	1000	UCUUGGU UUAUG GUAUGACUAUUG CGG GCGUUGG	2775
437	GAGGCGG G AAGGCCG	1001	CGGCUUU UUAUG GUAUGACUAUUG CGG GGGCCUU	2776
468	CHAGCCUU G CCUGGCU	1002	AGCAGCG UUAUG GUAUGACUAUUG CGG AGGCUUG	2777
480	UGGUCUUU G CUUGGAGU	1003	AUCCAGG UUAUG GUAUGACUAUUG CGG AGGAGCA	2778
493	GGUUGGG G CGGAGUG	1004	CACUCCG UUAUG GUAUGACUAUUG CGG GCGUCCG	2779
501	GGGAGAU G CUUGGCG	1005	GAGGCGU UUAUG GUAUGACUAUUG CGG AGUCCCG	2780
504	GGUUGGU G CUUGGCCA	1006	UGGCGAG UUAUG GUAUGACUAUUG CGG AGCAUCC	2781
508	UGUUGUUU G CCGAGGC	1007	GCGUUGG UUAUG GUAUGACUAUUG CGG AGGAGCA	2782
537	AUUGUUU G CCCCUGG	1008	CGAGGCG UUAUG GUAUGACUAUUG CGG AGGCGAG	2783
543	CUUCCUUU G CGCAGCG	1009	CGGUGGG UUAUG GUAUGACUAUUG CGG AGGCGAG	2784
545	GUUCCUUG G CAGAGGCC	1010	GGUUGGU UUAUG GUAUGACUAUUG CGG AGGCGAG	2785
562	UGGCGCG G CCGUUGG	1011	CAGGCGG UUAUG GUAUGACUAUUG CGG GCGUCCG	2786
576	CUUGGCUU G CGGCUCC	1012	GCGGCGG UUAUG GUAUGACUAUUG CGG AGGCGAG	2787
582	CUUGGCUU G CCGUUGG	1013	UCCGCGG UUAUG GUAUGACUAUUG CGG AGGCGAG	2788
595	GGGAGCC G CCGAGAG	1014	CUUUCUU UUAUG GUAUGACUAUUG CGG GCGUCCG	2789
598	AGGCGAG G AAGAGCC	1015	GGGCUUU UUAUG GUAUGACUAUUG CGG GCGUCCG	2790
607	AGAGCCC G AGGAGCC	1016	GGGCUUU UUAUG GUAUGACUAUUG CGG GCGUCCG	2791
654	AGAGACU G AGGCGCA	1017	UGGCGUU UUAUG GUAUGACUAUUG CGG AGGCGAG	2792
690	GGGAGAU G ACCUGGG	1018	CCGAGUU UUAUG GUAUGACUAUUG CGG AUGUCCG	2793
708	AGGCGCC G CAGAGCU	1019	AGGCGUU UUAUG GUAUGACUAUUG CGG GGGGCGU	2794
714	CGGAGAG G CUUAGAU	1020	AUGGAGG UUAUG GUAUGACUAUUG CGG GGGGCGU	2795
751	GUUAGAU G CAGGUGU	1021	AGGAGUU UUAUG GUAUGACUAUUG CGG AUGUCCG	2796
760	CAGUGGU G CUGGCCG	1022	GGGCGAG UUAUG GUAUGACUAUUG CGG AGGCGAG	2797
763	UGGUGUU G CCGGCCG	1023	CGGCGGG UUAUG GUAUGACUAUUG CGG AGGCGAG	2798

Table 20

780	CCCUCCU G CAUCGUA	1024	UAGGUAU UGAUG GCAUGCAUAUGC GCG AGGAAGG	2799
785	CCUGCAUC G CUACUACC	1025	GUAGUAG UGAUG GCAUGCAUAUGC GCG GAUGCAG	2800
843	GUUAUUGU G CCUGACU	1026	GUUAGUG UGAUG GCAUGCAUAUGC GCG ACUAACAC	2801
883	UGGCGACC G ACUGUGA	1027	UACAGGU UGAUG GCAUGCAUAUGC GCG GUUGCCCA	2802
921	GUACACUG G GUGUCCA	1028	UUGGCAG UGAUG GCAUGCAUAUGC GCG ACAGUAC	2803
925	CUUGUGGU G CCAACU	1029	AUUGUGG UGAUG GCAUGCAUAUGC GCG ACACAG	2804
934	CCAACAUU G CUCCCAUC	1030	AUGGCGA UGAUG GCAUGCAUAUGC GCG AUUGUGG	2805
937	ACUUGGU G CGAUCACU	1031	AUUGAUG UGAUG GCAUGCAUAUGC GCG ACACUUG	2806
946	CCUACACU G AUUGAGAC	1032	GUUGAUU UGAUG GCAUGCAUAUGC GCG AGUGAUG	2807
1006	UGGCGUAG G CUGGAGUU	1033	AUUCUAG UGAUG GCAUGCAUAUGC GCG AUAGCCA	2808
1009	CUAUGGU G AGAUUGCC	1034	GGCAUUC UGAUG GCAUGCAUAUGC GCG AGCAUAG	2809
1015	CUAGAUU G CGAGGCU	1035	AGGCCUG UGAUG GCAUGCAUAUGC GCG AUUCUAG	2810
1024	CGAGGCU G ACACUCC	1036	GGAGUUG UGAUG GCAUGCAUAUGC GCG AGGCUUG	2811
1027	GGCCUGAC G ACUGCCUG	1037	CAGGAGU UGAUG GCAUGCAUAUGC GCG GUACGCC	2812
1048	CUUUCUUU G ACUGUUG	1038	CAGAGGU UGAUG GCAUGCAUAUGC GCG AAGAAAG	2813
1092	UUUCUUUU G CAGCUUUG	1039	CAAGCUG UGAUG GCAUGCAUAUGC GCG AGGAGAA	2814
1105	UUUUGUU G CUGGCUUC	1040	GAAGCAG UGAUG GCAUGCAUAUGC GCG AGCAGAA	2815
1134	UCUGAGUU G CUGGCCUC	1041	CAGCAUU UGAUG GCAUGCAUAUGC GCG AGUCUGU	2816
1158	GGAGCAU G AUCAUUG	1042	GAGGCCAG UGAUG GCAUGCAUAUGC GCG ACUCAGA	2817
1174	GAGUUAU G ACCAUUG	1043	CCAUAGU UGAUG GCAUGCAUAUGC GCG AUGUCUC	2818
1182	GACCAUC G CUGUACUC	1044	CGAUUGU UGAUG GCAUGCAUAUGC GCG GAUACUC	2819
1234	GUUAUUAU G AGUGAUC	1045	GUUACAG UGAUG GCAUGCAUAUGC GCG GAUGGUC	2820
1239	UAUGAGUU G AUCAUUG	1046	GAUCACU UGAUG GCAUGCAUAUGC GCG AUUAUAC	2821
1248	AUCAUUGU G CGGUGGA	1047	ACAUAGU UGAUG GCAUGCAUAUGC GCG ACCUCAA	2822
1275	CAGNUGU G AAUAUGA	1049	UCCACCG UGAUG GCAUGCAUAUGC GCG AGUUCUG	2823
1286	AUGGACU G CAAGGAGU	1050	UCCAUUU UGAUG GCAUGCAUAUGC GCG AGUCUUA	2824
1303	ACAACAUU G ACAAGAC	1051	ACUCCUG UGAUG GCAUGCAUAUGC GCG AGUCUUA	2825
1344	CUUGCUU G CCGAGAA	1052	GUUCUUG UGAUG GCAUGCAUAUGC GCG AUUAUGU	2826
1360	AUGUUAU G AAGUGCA	1053	UUUCUGG UGAUG GCAUGCAUAUGC GCG AAACUAG	2827
1366	UUGAAGUU G CAGUAAA	1054	UUCAGCU UGAUG GCAUGCAUAUGC GCG AAACUUA	2828
1411	AGUUCUUU G AUGGUUC	1055	UUUACAG UGAUG GCAUGCAUAUGC GCG AGCUCAA	2829
1442	CGUGUGU G CUGGCAU	1056	GAACCAU UGAUG GCAUGCAUAUGC GCG AGGAAUC	2830
1504	UUAUGUU G AGGUUAC	1057	CUUGCCAG UGAUG GCAUGCAUAUGC GCG ACACGAC	2831
			GUUAUCC UGAUG GCAUGCAUAUGC GCG ACCCAUUA	2832

Table 20

1526	GUCCUUC G CAUCACA	1056	UGUGAUG UGAUG GCAUGCAUAUGC GCG UGAGGAC	2833
1542	AUCCUUC G CAGCAUA	1059	UAUUCUG UGAUG GCAUGCAUAUGC GCG GAGAGAU	2834
1554	CAUACU G CGGCGAU	1060	ACUGCGG UGAUG GCAUGCAUAUGC GCG AGAGUUG	2835
1588	CCAGAC G ACUGUAC	1061	GUACACU UGAUG GCAUGCAUAUGC GCG GUUCUUG	2836
1603	CAAGAUU G GCACUCA	1062	UGAGUUG UGAUG GCAUGCAUAUGC GCG AAATUUG	2837
1622	UGUUCUUU G AUUGGUC	1063	GGCCGUU UGAUG GCAUGCAUAUGC GCG AAGACAA	2838
1642	UGUGGCC G AAACGGA	1064	UUGGUUU UGAUG GCAUGCAUAUGC GCG GUUUUUG	2839
1668	CGAAAC G AAUUGCU	1065	AGCAAUU UGAUG GCAUGCAUAUGC GCG AAAGCGA	2840
1699	UGGCUUU G CUGGACG	1066	CGUGACG UGAUG GCAUGCAUAUGC GCG GUUACAG	2842
1708	CGUGACG G CUGGCUU	1067	AUGGACG UGAUG GCAUGCAUAUGC GCG AGGCGUG	2843
1712	CAGGCUU G CCAUGUG	1068	GCACAUU UGAUG GCAUGCAUAUGC GCG ACUUGCA	2844
1719	UGCCAUU G CAGCAUA	1069	UCAUCUG UGAUG GCAUGCAUAUGC GCG GUUGCAU	2845
1723	AUGGACG G AUGAGUC	1070	GAACUUA UGAUG GCAUGCAUAUGC GCG AUGUGCA	2846
1726	UGACAUU G AGUUGAG	1071	CCUGACU UGAUG GCAUGCAUAUGC GCG AUCUGCU	2847
1807	AGACAUU G AGUACAC	1072	GUUGACU UGAUG GCAUGCAUAUGC GCG AUGAGGU	2848
1821	ACCCUUAU G ACCAUAG	1073	GCUAUGU UGAUG GCAUGCAUAUGC GCG AGCCAUU	2849
1843	UCUUGCU G CCACUUG	1074	GCAGAUU UGAUG GCAUGCAUAUGC GCG AGAUGCA	2850
1850	UGCAUUCU G CGCCUUC	1075	AGAGGCG UGAUG GCAUGCAUAUGC GCG AGAUGG	2851
1852	CAUUCUG G CCUCUUC	1076	GAAGAGG UGAUG GCAUGCAUAUGC GCG AGAUGG	2852
1863	CUUUAU G CUGGCAU	1077	CAGAGUG UGAUG GCAUGCAUAUGC GCG AGCAUGA	2853
1866	UUAUCU G CCACUUG	1078	AGUGGAG UGAUG GCAUGCAUAUGC GCG AGAUGG	2854
1874	GCACUUC G CCUCUUG	1079	CCAUAGG UGAUG GCAUGCAUAUGC GCG AGAUGG	2855
1895	UCAUGUG G CUGGCUU	1080	GAAGGAG UGAUG GCAUGCAUAUGC GCG AGGCGAC	2856
1898	GUUGGCU G CUCUCCU	1081	AGCGAGG UGAUG GCAUGCAUAUGC GCG AGAUGG	2857
1904	CUGGCUU G CUGGCUU	1082	GCAGGAG UGAUG GCAUGCAUAUGC GCG AGGAGG	2858
1907	CGUGGCU G CUGGCGC	1083	GGCGGAG UGAUG GCAUGCAUAUGC GCG AGGAGG	2859
1911	CGUGGCU G CCGCAGA	1084	UGCUGG UGAUG GCAUGCAUAUGC GCG AGGAGG	2860
1913	CUGGCUU G CCGCAGC	1085	GCUGGUG UGAUG GCAUGCAUAUGC GCG AGGAGG	2861
1924	AGCAGCAU G AUGACUU	1086	AAAGUUA UGAUG GCAUGCAUAUGC GCG AUGGCUU	2862
1927	AGCAUGAU G ACUUAUU	1087	AAAGUUA UGAUG GCAUGCAUAUGC GCG AUGGCUU	2863
1933	AUGACUUU G CUGAGAC	1088	GUUUAU UGAUG GCAUGCAUAUGC GCG AGCAAAU	2864
1936	ACUUGCUU G AUGAGAC	1089	GAUUAU UGAUG GCAUGCAUAUGC GCG AUGAGCA	2865
1939	UGGUGAUU G ACAUUCU	1090	GAUUAU UGAUG GCAUGCAUAUGC GCG AUGAGCA	2866
1950	AUUCUUAU G CUGAGUG	1091	CACUUCG UGAUG GCAUGCAUAUGC GCG AGGAGAU	2866

Table 20

1953	UCCUUGCU G AAGUGAGG	1092	CCUCACUU UGAUG GCAUGACUAUUG GCG AGCAGGA	2867
1958	GCUGAAGU G AGGAGGTC	1093	GGCCUCCU UGAUG GCAUGACUAUUG GCG ACUUGAGC	2868
2087	CACCAAAU G CCUUGGCC	1094	GGCAGAGG UGAUG GCAUGACUAUUG GCG AUGAGGAG	2869
2093	AUGCCUCCU G CCGUGBAG	1095	CAUCAGAG UGAUG GCAUGACUAUUG GCG AGAGCAU	2870
2098	UUGGCCUU G AUGGAGAA	1096	UUCUCUAU UGAUG GCAUGACUAUUG GCG AAGGCAGA	2871
2179	AGCACUCCU G CUGGCGGG	1097	CCGCGCAG UGAUG GCAUGACUAUUG GCG AGAGGCU	2872
2227	GAATATCCU G CUCGUUGA	1098	UCAGAGG UGAUG GCAUGACUAUUG GCG AGAATUUC	2873
2230	AUUCUCCU G GUGAAGC	1099	GUUCACAG UGAUG GCAUGACUAUUG GCG AGCAGAAU	2874
2234	UGUGCCUU G AACCUCCA	1100	UGAAGUUU UGAUG GCAUGACUAUUG GCG AGCAGACA	2875
2248	UGGCCUCCU G AACCUUGG	1101	CAAAGUUU UGAUG GCAUGACUAUUG GCG AGGGCUGA	2876
2329	CAUCACAG G CAGGUUAC	1102	GUACCCUG UGAUG GCAUGACUAUUG GCG GUGUGAG	2877
2393	GUUUFCCU G CUGGCCAA	1103	UUGGCCAG UGAUG GCAUGACUAUUG GCG AGGAAAC	2878
2419	GGAGAGAU G CACAGUUU	1104	AAACUUGG UGAUG GCAUGACUAUUG GCG AUCCUUC	2879
2428	CACAGUUU G CUAUUUGC	1105	GCAUAAAG UGAUG GCAUGACUAUUG GCG AAACUUG	2880
2435	UGCUUUU G CUUUAGAG	1106	CUUAAAAG UGAUG GCAUGACUAUUG GCG AAUAAGCA	2881
2476	ACAUUGGU G CAAAGAUU	1107	AUUCUUUG UGAUG GCAUGACUAUUG GCG ACCUAUGU	2882
2485	CACAGUUU G CUCUUGA	1108	UCACAGAG UGAUG GCAUGACUAUUG GCG AUUUIUG	2883
2492	UGCCUCCU G AAUUAUAA	1109	UUUUAAUU UGAUG GCAUGACUAUUG GCG AAGAGGCA	2884
219	GUGCCGAGU G UAGCGGGC	1110	GGCCGCUA UGAUG GCAUGACUAUUG GCG ACUGGCAC	2885
483	CUCCUGCU G UGAGUGGG	1111	CCCAUCCA UGAUG GCAUGACUAUUG GCG AGCAGAG	2886
634	GCAGCUUU G UGAGAGUG	1112	CAUCUCCA UGAUG GCAUGACUAUUG GCG AAAGCUGC	2887
804	AGGACGCU G UCCAGCAC	1113	GUUCUGGA UGAUG GCAUGACUAUUG GCG AGCUCUUC	2888
835	GGAGAGGU G UGUUUUGU	1114	CACUAACA UGAUG GCAUGACUAUUG GCG ACCUUGCC	2889
837	AAGGGGUGU G UAUGUGCC	1115	GGCACUAU UGAUG GCAUGACUAUUG GCG ACACCCUU	2890
841	GUGUGUAU G UGCCCCUAC	1116	GUAGAGCA UGAUG GCAUGACUAUUG GCG AUAACAC	2891
919	ACUUCACU G UGUUGUCC	1117	GGCAGGCA UGAUG GCAUGACUAUUG GCG AUGAGCU	2892
1100	CGACGUUU G UGUUGUCU	1118	GACACACA UGAUG GCAUGACUAUUG GCG AAGCUGC	2893
1144	UGGCUCU G UCGGAGGG	1119	CCUUCOGA UGAUG GCAUGACUAUUG GCG AGAGGCA	2894
1185	CACUUGCU G UACACAGG	1120	CCGUGUGA UGAUG GCAUGACUAUUG GCG AGCGAGU	2895
1246	UGAUCAUU G UGCGGGUG	1121	CACCGCA UGAUG GCAUGACUAUUG GCG AAUGAUA	2896
1315	AGACAAUU G UGAGCAGU	1122	ACUUCUCCA UGAUG GCAUGACUAUUG GCG AUUGUCU	2897
1356	AAGAAAGU G UDUUAGGC	1123	GUCCUCAA UGAUG GCAUGACUAUUG GCG ACUUCUUU	2898
1440	CAGCUGGU G UGUUGGCA	1124	UGCCAGCA UGAUG GCAUGACUAUUG GCG ACNAGUG	2899
1570	UGGAGAGU G UUGGCCAG	1125	QUUGGCCA UGAUG GCAUGACUAUUG GCG AUUCUCCA	2900

Table 20

1592	AGAGGACU G UUAACAAGU	1126	ACUUGUAA UGAUG GCAUGGACUAUGC GCG AGUGUCU	2901
1630	CGGGACU G UUAUGGA	1127	UCCCAUAA UGAUG GCAUGGACUAUGC GCG AGUGCCG	2902
1642	UGGAGACU G UUAUAUG	1128	CAUGNAA UGAUG GCAUGGACUAUGC GCG AGUCCCA	2903
1666	UCUAGCU G UCUUGAU	1129	AUCNAAAG UGAUG GCAUGGACUAUGC GCG ACGUGAA	2904
1702	GUUUGCU G UCAGGCU	1130	AGCCUGA UGAUG GCAUGGACUAUGC GCG AGGAAAG	2905
1717	CUUGCCAU G UGCAGAU	1131	AUCGUGA UGAUG GCAUGGACUAUGC GCG AUGGAG	2906
1759	GCCUUUU G UCACCUUG	1132	CAAGGUA UGAUG GCAUGGACUAUGC GCG AAAGGCC	2907
1781	GGAGACU G UGGCUACA	1133	UGUAGCCA UGAUG GCAUGGACUAUGC GCG AGUCUCC	2908
1834	UAGCCUAG G UCAUGCU	1134	AGCCAUAA UGAUG GCAUGGACUAUGC GCG AUGGGCUA	2909
1884	CUCAUGU G UGUACAGU	1135	CACUGACA UGAUG GCAUGGACUAUGC GCG ACACUAG	2910
1886	CAUGUGU G UCAUGUGC	1136	GCACUGA UGAUG GCAUGGACUAUGC GCG AGUCCCA	2911
2048	UGGACCU G UGGCCNGA	1137	UCUGGCCA UGAUG GCAUGGACUAUGC GCG AGUCCCA	2912
2139	CAGGACU G UACCUUGA	1138	UACAGGUA UGAUG GCAUGGACUAUGC GCG AGUCCUG	2913
2145	CUGUACU G UAGGAAC	1139	GUUUCCTA UGAUG GCAUGGACUAUGC GCG AGGUACAG	2914
2256	GNACUUI G UCCACCU	1140	AUGGUGGA UGAUG GCAUGGACUAUGC GCG AAAGGUIC	2915
2346	CUUGGCU G UGUCCUUG	1141	CAGGACA UGAUG GCAUGGACUAUGC GCG AGCCCAAG	2916
2348	UGGCGUGU G UCCUUGUG	1142	CACAGGGA UGAUG GCAUGGACUAUGC GCG ACACGCCA	2917
2354	GUUUCUU G UGUUACCC	1143	GGGUACCA UGAUG GCAUGGACUAUGC GCG AGGACAC	2918
2385	CGAGCUU G UUUCCUUG	1144	CAGGAAA UGAUG GCAUGGACUAUGC GCG AUGCUUGG	2919
2453	CAGGGACU G UAUAAACA	1145	UGUUUAAA UGAUG GCAUGGACUAUGC GCG AGUCCUUG	2920

Input Sequence = AF190725. Cut site = G/.

Stem Length = 8. Core Sequence = UGAUG GCAUGGACUAUGC GCG

AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 21

Table 21: Human BACE Zinzyme Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rs Seq ID
11	ACGCGUCC G CAGCCCGC	960	GCGGGCUG GCCGAAAGGCGAGUCAAGGUU	GGACGCGU 2921
18	CGCAGCCC G CCGCGGAG	961	CUCGCGGG GCCGAAAGGCGAGUCAAGGUU	GCGCUGCG 2922
29	CGGAGGUG G CGAGCCGC	962	GCGGCGUG GCCGAAAGGCGAGUCAAGGUU	AGCUCGCG 2923
36	UGCGAGCC G CGAGCUGG	964	CCAGCUGG GCCGAAAGGCGAGUCAAGGUU	GCGCUGCA 2924
69	CAGCCAAC G CAGCCGCA	967	UGCGGUGU GCCGAAAGGCGAGUCAAGGUU	GUUGCGU 2925
75	ACGCGCCG G CAGGAGCC	968	GGCUGCCU GCCGAAAGGCGAGUCAAGGUU	GGCUGCGU 2926
94	GAGCCCUU G CCGCUGCC	969	GGCAGGGG GCCGAAAGGCGAGUCAAGGUU	AAGGGCCU 2927
100	UGGCCCCU G CCGCGCCG	970	GGCGGCGG GCCGAAAGGCGAGUCAAGGUU	AGGGGCAA 2928
104	CCGCGCCC G CGCGCGCG	971	CGCGGCGG GCCGAAAGGCGAGUCAAGGUU	GCGCGGCG 2929
106	CUGCGCGG G CCGCGCGC	972	GGCGGCGG GCCGAAAGGCGAGUCAAGGUU	GCGGGCAG 2930
109	CCGCGCGC G CCGCGCGC	973	GCGGGCGG GCCGAAAGGCGAGUCAAGGUU	GCGCGCGG 2931
112	GCGCGCGC G CCGCGCGG	974	CCCGCGGG GCCGAAAGGCGAGUCAAGGUU	GCGCGCGC 2932
116	CGCGCGCC G CCGCGCGG	975	CCCCCGGG GCCGAAAGGCGAGUCAAGGUU	GCGCGCGC 2933
137	GGGAGGCC G CCACCGC	976	CGCGGUGG GCCGAAAGGCGAGUCAAGGUU	GCGCUGCC 2934
148	ACGCGCCC G CCAUGCCC	977	GGGCAUUG GCCGAAAGGCGAGUCAAGGUU	GGGCGAGU 2935
153	CCCGCCAU G CCGCGCCC	978	GCGGGCGG GCCGAAAGGCGAGUCAAGGUU	AUGGCGGG 2936
157	CCAUCCGC G CCGCUGCC	979	GCGAGGGG GCCGAAAGGCGAGUCAAGGUU	GCGGCAUG 2937
172	CCAGCCCC G CCGGGAGC	980	GCUCGCGG GCCGAAAGGCGAGUCAAGGUU	GCGGCGCG 2938
183	GGGAGCCC G CGCCCGCU	981	AGCGGGCG GCCGAAAGGCGAGUCAAGGUU	GCGGGCUC 2940
185	GAGCCCGC G CCGCGUGC	982	CGAGCGGG GCCGAAAGGCGAGUCAAGGUU	GCGGGCUC 2941
189	CGCGCGCC G CUGCCGAG	983	CUGGGCAG GCCGAAAGGCGAGUCAAGGUU	GCGGCGCG 2942
192	CGCCCGCU G CCGAGCCU	984	AGCCUGGG GCCGAAAGGCGAGUCAAGGUU	GCGGCGCG 2943
205	GGCUGGCC G CCGCGGUG	985	CAGCGCGG GCCGAAAGGCGAGUCAAGGUU	GCGGCGCG 2944
208	UGGCGCGC G CCGUGCGG	986	CGGCGCGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2945
213	GCGCGCGU G CCGAUGUA	987	UACCAUCG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2946
250	UCUCGCCU G CUCGCGUG	989	CAGCGGAG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2947
258	GCUCGCCU G CUCGCGUG	990	CCGCGAGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2948
263	CGUGCCUG G CCGAUCUC	991	GAGAUCCG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2949
280	CCGUGACC G CUCUCAC	993	GUGGAGAG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2950
320	AGGGCCCU G CAGGCCCC	994	AGGGCCUG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2951
340	GUCCUGAU G CCCCAGAG	996	CUGGGGGG GCCGAAAGGCGAGUCAAGGUU	AUCAGGAG 2952
397	CGGAGGCG G CAGCGGAC	998	GUCCUGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2953
420	GGGCGAGU G CGAGCCCA	999	UGGGGUGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2954
468	CNAGCCCU G CCGUGGCU	1002	AGCCAGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2955
480	UGGCGUCU G CUGUGGAU	1003	AUCCACAG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2956
493	GGAUGGCG G CGGGAGUG	1004	CACUCCCG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2957
501	CGGGAGAG G CAGCUGGC	1005	GCGGCGAG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2958
504	GGAGUGCU G CCGGCCCA	1006	UGGGGAGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2959
508	UGGUGGCU G CCGCGCGC	1007	GCGGUGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2960
537	AUCCGGCU G CCGCGCGC	1008	CGCAGGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2961
543	CUGGCCCC G CGGAGCGG	1009	CCGUGCGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2962
545	GCCCCUGC G CAGCGGCC	1010	GGCGCGUG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2963
562	UGGGGGCG G CCGCCGUG	1011	CAGGGGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2964
576	CUGGGGCU G CCGCGCGC	1012	GCGCAGCG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2965
582	CUGGCGCU G CCGCGGGA	1013	UCCCGGGG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2966
708	AGCCCCCG G CAGAGCGU	1019	AGCGUGUG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2967
714	CCGCGAGC G CUCAACAU	1020	AUGUUGAG GCCGAAAGGCGAGUCAAGGUU	AGGCGGCG 2967

Table 21

751	GUAACTU G	CAGUGGU	1021	ACCCACUG	GCCGAAAGGCGAGUCAAGGUU	AAAGUUAC	2968
760	CAGUGGU G	CUGCCCC	1022	GUGGCGAG	GCCGAAAGGCGAGUCAAGGUU	ACCCACUG	2969
763	UGGUGGU G	CCCCCAC	1023	GUGGCGAG	GCCGAAAGGCGAGUCAAGGUU	AGCACCCA	2970
780	CCCTUCCU G	CAUGGUA	1024	UAGCGAUG	GCCGAAAGGCGAGUCAAGGUU	AGGAAGGG	2971
785	CCUGCAUC G	CUACUACC	1025	GGUAGUAG	GCCGAAAGGCGAGUCAAGGUU	GAUGCAGG	2972
843	GUGUAUGU G	CCCUACAC	1026	GUGUAGGG	GCCGAAAGGCGAGUCAAGGUU	ACAUCAC	2973
921	GUACUGU G	CGUGCCAA	1028	UUGGCACG	GCCGAAAGGCGAGUCAAGGUU	ACAGUGAC	2974
925	CUGUGCCU G	CCAACAUU	1029	AAUGUUGG	GCCGAAAGGCGAGUCAAGGUU	ACGCACAG	2975
934	CCAACAUU G	CUGCCAUU	1030	GAGGCGAG	GCCGAAAGGCGAGUCAAGGUU	AAUGUUGG	2976
937	ACAUGUCU G	CCAUCACU	1031	AGUGAUGG	GCCGAAAGGCGAGUCAAGGUU	AGCAAUUG	2977
1006	UGGCGCAU G	CUGAGAAU	1033	AAUCUCAG	GCCGAAAGGCGAGUCAAGGUU	AUAGGCCA	2978
1015	CUGAGAAU G	CAGAGCCU	1035	AAGCCTUG	GCCGAAAGGCGAGUCAAGGUU	AAUCUCAG	2979
1092	UUCUCCCU G	CAGCUUUG	1039	CAAGGCGU	GCCGAAAGGCGAGUCAAGGUU	AGGGAGAA	2980
1105	UUUGUGGU G	CGUGCCUC	1040	GAGGCCAG	GCCGAAAGGCGAGUCAAGGUU	ACCAACAA	2981
1134	UCUGAAGU G	CUGGCCUC	1042	GAGGCCAG	GCCGAAAGGCGAGUCAAGGUU	ACUUCAGA	2982
1182	GACCAUCU G	CUGUACAC	1045	GUGUACAG	GCCGAAAGGCGAGUCAAGGUU	GAGUGGUC	2983
1248	AUCAUUGU G	CGGUGGGA	1048	UCCACCCG	GCCGAAAGGCGAGUCAAGGUU	ACAAUGAU	2984
1286	AAUGAUCU G	CAAGGAGU	1050	ACUCUUGG	GCCGAAAGGCGAGUCAAGGUU	AGUCCAUU	2985
1344	CUUCGUUU G	CCCAAGAA	1052	UUUCUUGG	GCCGAAAGGCGAGUCAAGGUU	AAACGAA	2986
1366	UUGAAGCU G	CAGUCAAA	1054	UUUGACUG	GCCGAAAGGCGAGUCAAGGUU	AGUCUCAA	2987
1442	GCUGUGUG G	CUGGCCAG	1056	CUUGCCAG	GCCGAAAGGCGAGUCAAGGUU	ACACCCAG	2988
1526	GUCUCCUC G	CAUCACCA	1058	UGGUGAUG	GCCGAAAGGCGAGUCAAGGUU	GGAAAGGAC	2989
1542	AUCCUCCU G	CAGCAUAU	1059	UAUUGGUG	GCCGAAAGGCGAGUCAAGGUU	GGAGGAUG	2990
1554	CAUUAUCU G	CAGCCAGU	1060	ACUGGCCG	GCCGAAAGGCGAGUCAAGGUU	AGGUUAUG	2991
1603	ACAAGUUU G	CCAUCUCA	1062	UGAGAUUG	GCCGAAAGGCGAGUCAAGGUU	AAACUUGU	2992
1699	UUUGGCUU G	CUGUGCAG	1066	CGUCACAG	GCCGAAAGGCGAGUCAAGGUU	AAAGCCAA	2993
1708	CUGUGCAG G	CUUGCCAU	1067	AUGGCAAG	GCCGAAAGGCGAGUCAAGGUU	GCUCACAG	2994
1712	CAGCGCUU G	CCAUGUGC	1068	GCACAUUG	GCCGAAAGGCGAGUCAAGGUU	AAGCGCUG	2995
1719	UGCGAUGU G	CAGCAUGA	1069	UCAUCGUG	GCCGAAAGGCGAGUCAAGGUU	ACAUUGCA	2996
1843	UCAUGGCU G	CCAUCUGC	1074	GCAGAUUG	GCCGAAAGGCGAGUCAAGGUU	AGCCAUUA	2997
1850	UGCGCAUCU G	CGCCCUUC	1075	AGAGGGCG	GCCGAAAGGCGAGUCAAGGUU	AGAUUGCA	2998
1852	CCAUCUGC G	CCUUCUUC	1076	GAAGAGGG	GCCGAAAGGCGAGUCAAGGUU	GCAGAUUG	2999
1863	CUUCUCAU G	CUGCCACU	1077	AGUGGCCAG	GCCGAAAGGCGAGUCAAGGUU	AUGAAGAG	3000
1866	UUCAUGCU G	CGACUCUG	1078	CAGAGUGG	GCCGAAAGGCGAGUCAAGGUU	AGCAUGAA	3001
1874	GCCACUCU G	CCUCAUUG	1079	CCAUAAGG	GCCGAAAGGCGAGUCAAGGUU	AGAGUGGC	3002
1895	UCAGUGGC G	CUGCCUUC	1080	GGAGGCAG	GCCGAAAGGCGAGUCAAGGUU	GCCACUGA	3003
1898	GUGGCGCU G	CCUCCCGU	1081	AGCGGAGG	GCCGAAAGGCGAGUCAAGGUU	AGGCCAC	3004
1904	CUGCCUCC G	CUGCCUUG	1082	CGAGGCAG	GCCGAAAGGCGAGUCAAGGUU	GGAGGCAG	3005
1907	CCUCCCGU G	CUGGCCGC	1083	GGCGGCGG	GCCGAAAGGCGAGUCAAGGUU	AGCGGAGG	3006
1911	CGCUGCCU G	CGCCAGCA	1084	UGCUUGCG	GCCGAAAGGCGAGUCAAGGUU	AGGCAGCG	3007
1913	CUGCCUCC G	CCAGCAGC	1085	CGUCUGUG	GCCGAAAGGCGAGUCAAGGUU	CGAGCGAG	3008
1933	AUGACUUU G	CUGAUGAC	1088	GUCAUCAG	GCCGAAAGGCGAGUCAAGGUU	AAAGUCAU	3009
1950	AUUCUCCU G	CUGAAGUG	1091	CACUUCAG	GCCGAAAGGCGAGUCAAGGUU	AGGGAGAU	3010
2087	CACCAAAU G	CCUUCGCC	1094	GGCAGAGG	GCCGAAAGGCGAGUCAAGGUU	AUUUGUGU	3011
2093	AUGCCUCC G	CCUUGAUG	1095	CAUCAAGG	GCCGAAAGGCGAGUCAAGGUU	AGAGGCAU	3012
2179	AGCACUCU G	CUGGCGGG	1097	CCCGCCAG	GCCGAAAGGCGAGUCAAGGUU	AGAGUGGU	3013
2227	GAUAUUCU G	CUGCUUGA	1098	UCAAGCAG	GCCGAAAGGCGAGUCAAGGUU	AGAAUUCU	3014
2230	AUUCUGCU G	CUUGAAAC	1099	GUUUAACG	GCCGAAAGGCGAGUCAAGGUU	AGGAGAAU	3015
2329	CAUCACAC G	CAGGUAAC	1102	GUAAACUG	GCCGAAAGGCGAGUCAAGGUU	GUGUGAUG	3016
2393	GUUUCUCC G	CUGGCCAA	1103	UUGGCCAG	GCCGAAAGGCGAGUCAAGGUU	AGGGAAC	3017
2419	GAGAGGAU G	CACAGUUU	1104	AAACUGUG	GCCGAAAGGCGAGUCAAGGUU	AUCCUUCU	3018

Table 21

2428	CACAGUUT	G	CUAUUUGC	1105	GC AAAUAG	GCCGAAAGGCGAGUCAAGGUCU	AAACUGUG	3019
2435	UGCUAUUT	G	CUUUGAG	1106	CUCUAAAG	GCCGAAAGGCGAGUCAAGGUCU	AAAUAGCA	3020
2476	ACAUUGGU	G	CAAAGAUU	1107	AAUCUUUG	GCCGAAAGGCGAGUCAAGGUCU	ACCAAUUG	3021
2485	CAAAGAUU	G	CCUCUUGA	1108	UCAAGAGG	GCCGAAAGGCGAGUCAAGGUCU	AUUCUUUG	3022
219	GUGCGCAU	G	UAGCGGGC	1110	GCCCGCUA	GCCGAAAGGCGAGUCAAGGUCU	AUCGGCAC	3023
483	CUCUCGU	G	UGGAUUGG	1111	CCCAUCCA	GCCGAAAGGCGAGUCAAGGUCU	AGCAGGAG	3024
634	GCAGCUU	G	UGGAGUUG	1112	CAUCUCCA	GCCGAAAGGCGAGUCAAGGUCU	AAAGCUGC	3025
804	AGGCACAU	G	UCCAGCAC	1113	GUGCGUGA	GCCGAAAGGCGAGUCAAGGUCU	AGCUGCCU	3026
835	GGAGAGGU	G	UCUUGUGU	1114	CACAUACA	GCCGAAAGGCGAGUCAAGGUCU	AGCCUUUC	3027
837	AAGCGUGU	G	UAUGUUGC	1115	GGCACAU	GCCGAAAGGCGAGUCAAGGUCU	ACACCCUU	3028
841	GUGUGU	G	UGCCCUAC	1116	GUAGGGCA	GCCGAAAGGCGAGUCAAGGUCU	AUACGAC	3029
919	ACGUCACU	G	UGCGUGGC	1117	GGCACGCA	GCCGAAAGGCGAGUCAAGGUCU	AGUGACGU	3030
1100	GCAGCUU	G	UGGUGUGU	1118	CAGCACCA	GCCGAAAGGCGAGUCAAGGUCU	AAAGCUGC	3031
1144	UGGCGUCU	G	UCGGAGGG	1119	CCUCCGCA	GCCGAAAGGCGAGUCAAGGUCU	AGAGGCCA	3032
1185	CACUCGU	G	UACACAGG	1120	CCUGUGUA	GCCGAAAGGCGAGUCAAGGUCU	AGCGAGUG	3033
1246	UGAUCAU	G	UGCGGGUG	1121	CACCCGCA	GCCGAAAGGCGAGUCAAGGUCU	AAUGAUCA	3034
1315	AGAGCAU	G	UGGACAGU	1122	ACUGUCCA	GCCGAAAGGCGAGUCAAGGUCU	AUUGCUCU	3035
1356	AAGAAGAU	G	UUUGAAGC	1123	GCUCUAAA	GCCGAAAGGCGAGUCAAGGUCU	ACUUUUCU	3036
1440	CAGCUGGU	G	UGUGGGCA	1124	UGCCAGCA	GCCGAAAGGCGAGUCAAGGUCU	ACCAGCUG	3037
1570	UGGAAGAU	G	UGGGCACG	1125	CGUGGCCA	GCCGAAAGGCGAGUCAAGGUCU	AUCUCCA	3038
1592	AGACGACU	G	UUACAAGU	1126	ACUUGUAA	GCCGAAAGGCGAGUCAAGGUCU	AGUCGUCU	3039
1630	CGGGCACU	G	UUUAGGGA	1127	UCCCAUAA	GCCGAAAGGCGAGUCAAGGUCU	AGUGCCCG	3040
1642	UGGAGGU	G	UUUAUAGU	1128	CAUGAUAA	GCCGAAAGGCGAGUCAAGGUCU	AGUCUCCA	3041
1666	UUAACGUU	G	UGUUUAU	1129	AUCAAGAA	GCCGAAAGGCGAGUCAAGGUCU	AAGCUAGA	3042
1702	GUUUUGCU	G	UCAGCGCU	1130	AGCGCUGA	GCCGAAAGGCGAGUCAAGGUCU	AGCAAAAG	3043
1717	CUUGCCAU	G	UGCAGCAU	1131	AUCUGUCA	GCCGAAAGGCGAGUCAAGGUCU	AUUGCAAG	3044
1759	GCCUUUUU	G	UCACCUUG	1132	CAAGGUGA	GCCGAAAGGCGAGUCAAGGUCU	AAAAGGGC	3045
1781	GGAAAGAU	G	UGGCUACA	1133	UGUAGCCA	GCCGAAAGGCGAGUCAAGGUCU	AGUCUUCC	3046
1834	UAGCCUUA	G	UCAUGGCU	1134	AGCCAUUA	GCCGAAAGGCGAGUCAAGGUCU	AUAGGCUA	3047
1884	CUCAUGGU	G	UGUCAGUG	1135	CACUGACA	GCCGAAAGGCGAGUCAAGGUCU	ACCAUGAG	3048
1886	CAUGUGGU	G	UCAGUGGC	1136	GCACAUGA	GCCGAAAGGCGAGUCAAGGUCU	ACACCAUG	3049
2048	UGGCACCU	G	UGGCAGAG	1137	UCUGGCCA	GCCGAAAGGCGAGUCAAGGUCU	AGGUGCCA	3050
2139	CAGGAGCU	G	UACCUUUA	1138	UACAGGUA	GCCGAAAGGCGAGUCAAGGUCU	AGUCUCCU	3051
2145	CUUUAUCC	G	UGGAAAC	1139	GUUUCCUA	GCCGAAAGGCGAGUCAAGGUCU	AGGUACAG	3052
2256	GAACCUU	G	UCCACCAU	1140	AUGGUGGA	GCCGAAAGGCGAGUCAAGGUCU	AAAGGUUC	3053
2346	CUUGGGGU	G	UGUCCCGU	1141	CAGGGACA	GCCGAAAGGCGAGUCAAGGUCU	AGCCCAUG	3054
2348	UGGCGUGU	G	UCCUUGUG	1142	CACAGGGA	GCCGAAAGGCGAGUCAAGGUCU	ACACGCCA	3055
2354	GUGUCCCU	G	UGGUACCC	1143	GGGUACCA	GCCGAAAGGCGAGUCAAGGUCU	AGGACAC	3056
2385	CCAAAGUU	G	UGUCCCGU	1144	CAGGGA	GCCGAAAGGCGAGUCAAGGUCU	AAGCUUGC	3057
2453	CAGGAGCU	G	UAUAAACA	1145	UGUUUAUA	GCCGAAAGGCGAGUCAAGGUCU	AGUCCUUG	3058
14	GUCCCGCA	G	CCCGCCCG	1146	CGGGCGGG	GCCGAAAGGCGAGUCAAGGUCU	UGCGGACG	3059
26	GCCTGGGA	G	CUGCGAGC	1147	GCUCGCGA	GCCGAAAGGCGAGUCAAGGUCU	UCCCGGGC	3060
33	AGCUGCGA	G	CCCGAGCG	1148	GCUCGCGG	GCCGAAAGGCGAGUCAAGGUCU	UCGACGCU	3061
40	AGCCGCGA	G	CUGGAUUA	1149	UAUUCGAG	GCCGAAAGGCGAGUCAAGGUCU	UGCGGCGU	3062
51	GGAUUAUG	G	UGGCCUGA	1150	UCAGGCCA	GCCGAAAGGCGAGUCAAGGUCU	CAUAUCC	3063
54	UAUUGGUG	G	CCUGAGCA	1151	UGCUCAGG	GCCGAAAGGCGAGUCAAGGUCU	CACCAUAA	3064
60	UGGCCUUA	G	GACCCAAC	1152	GUUGGCGU	GCCGAAAGGCGAGUCAAGGUCU	UCAGGCCA	3065
63	CCUGAGCA	G	CCACAGCA	1153	UGCGUUGG	GCCGAAAGGCGAGUCAAGGUCU	UGCUCAGG	3066
72	CCACAGCA	G	CCGACGGA	1154	UCCUGCGG	GCCGAAAGGCGAGUCAAGGUCU	UGCGUUGG	3067
81	CCGACGGA	G	CCCGGAGC	1155	GCUCGCGG	GCCGAAAGGCGAGUCAAGGUCU	UCCUGCGG	3068
88	AGCCCGGA	G	CCCUUGCC	1156	GGCAAGGG	GCCGAAAGGCGAGUCAAGGUCU	UCCGGGCU	3069

Table 21

134	CCAGGAA G	CCCGCACC	1157	GGUGCGG	GCCGAAAGCGAGUCAAGGUCU	UUCUCCUGG	3070
144	CGCCACC G	CCCGCCAU	1158	AUGGCGGG	GCCGAAAGCGAGUCAAGGUCU	CGUGUGCG	3071
167	CCUCCCA G	CCCGCGCG	1159	CGCGGGG	GCCGAAAGCGAGUCAAGGUCU	UGGGAAGG	3072
179	CGCGGGA G	CCCGCGCC	1160	GGCGGGG	GCCGAAAGCGAGUCAAGGUCU	UCCCGGCG	3073
198	CUGGCCAG G	CUGGCCCG	1161	GCGGCCG	GCCGAAAGCGAGUCAAGGUCU	CUGGGCAG	3074
202	CCAGCGUG G	CGCGCGCG	1162	GCGCGCG	GCCGAAAGCGAGUCAAGGUCU	CAGCCUGG	3075
211	CGCGCGCG G	UGCGGAUG	1163	CAUCGCA	GCCGAAAGCGAGUCAAGGUCU	GCGGCGCG	3076
222	CCGGAUGA G	CGGGGCU	1164	GGAAGCG	GCCGAAAGCGAGUCAAGGUCU	UACAUCCG	3077
226	UGAAGCG G	CUCGGAU	1165	AUCCGAG	GCCGAAAGCGAGUCAAGGUCU	CCGCUACA	3078
239	GGAUCCCA G	CCUUCUCC	1166	GGGAGAG	GCCGAAAGCGAGUCAAGGUCU	UGGGAUCC	3079
256	CUGCUCCG G	UGCUUGCG	1167	GCAGAGCA	GCCGAAAGCGAGUCAAGGUCU	CGGAGGCG	3080
290	UCUCCACA G	CCCGGACC	1168	GUUCGGG	GCCGAAAGCGAGUCAAGGUCU	UGUGGAGA	3081
304	ACCCGGGG G	CUGGCCCA	1169	UGGCGCAG	GCCGAAAGCGAGUCAAGGUCU	CCCCGGGU	3082
308	GGGGGUG G	CCCGAGGC	1170	GCCUUGG	GCCGAAAGCGAGUCAAGGUCU	CAGCCCCC	3083
315	GGCCCGAG G	CCCGGAGC	1171	CUGCAGGG	GCCGAAAGCGAGUCAAGGUCU	CUUGGGCG	3084
324	CCUCCGAG G	CCUUGGCG	1172	CGCAGAG	GCCGAAAGCGAGUCAAGGUCU	CUGCAGGG	3085
330	AGGCGCCG G	CGUCCUGA	1173	UCAGGACG	GCCGAAAGCGAGUCAAGGUCU	CAGGCGCU	3086
332	GCCUCCUG G	UCCUGAUG	1174	CAUCAGGA	GCCGAAAGCGAGUCAAGGUCU	GCCAGGCG	3087
348	GGCCCCAA G	CUCCUCCU	1175	AGAGGAG	GCCGAAAGCGAGUCAAGGUCU	UUGGGGCG	3088
365	CCUGAGAA G	CCACGAGC	1176	CGUUGUG	GCCGAAAGCGAGUCAAGGUCU	UUCUACAG	3089
372	AGCCACCA G	CACCAACC	1177	GGUUGGUG	GCCGAAAGCGAGUCAAGGUCU	UGGUGCCG	3090
391	ACUUGGGG G	CAGGCGCC	1178	GCGCGUG	GCCGAAAGCGAGUCAAGGUCU	CCCCAAGU	3091
395	GGGGGCG G	CGCCAGGG	1179	CCUUGCG	GCCGAAAGCGAGUCAAGGUCU	CUGCCCCC	3092
410	GGAGCGAG G	UGCGAGAG	1180	CUGGCCCA	GCCGAAAGCGAGUCAAGGUCU	GUCGCUCC	3093
414	GGACGUGG G	CCAGUUGC	1181	CGCACUGG	GCCGAAAGCGAGUCAAGGUCU	CCACGUCU	3094
418	GUGGGGCG G	UGCGAGCC	1182	GGCUCGCA	GCCGAAAGCGAGUCAAGGUCU	UGGCGCAC	3095
424	CAGUGCGA G	CCAGAGGG	1183	CCUUCUGG	GCCGAAAGCGAGUCAAGGUCU	UCCGACUG	3096
433	CCAGAGGG G	CCCGAAGG	1184	CCUUCGGG	GCCGAAAGCGAGUCAAGGUCU	CCUUCGGG	3097
441	GGCCGAAG G	CUGGGGCG	1185	GGCCCCG	GCCGAAAGCGAGUCAAGGUCU	CUUCGGCG	3098
447	AGGCGGGG G	CCCAACAU	1186	AUGGUGGG	GCCGAAAGCGAGUCAAGGUCU	CCCGGCGU	3099
457	CCACCAUG G	CCCAAGCC	1187	GGCUUGGG	GCCGAAAGCGAGUCAAGGUCU	CAUGGUGG	3100
463	UGGCCCAA G	CCUUGGCC	1188	GGGCAAGG	GCCGAAAGCGAGUCAAGGUCU	UUGGGCCA	3101
474	CUGCCCGU G	CUCCUGCU	1189	AGCAGGAG	GCCGAAAGCGAGUCAAGGUCU	CAGGGCAG	3102
491	GUGGAUUG G	CGCGGAG	1190	CUCCCGCG	GCCGAAAGCGAGUCAAGGUCU	CCAUCCAC	3103
499	GCGCGGGA G	UGCUUGCU	1191	AGGCAGCA	GCCGAAAGCGAGUCAAGGUCU	UCCCGGCG	3104
515	UGCCACAG G	CACCCAGC	1192	CGUGGGUG	GCCGAAAGCGAGUCAAGGUCU	CGUGGGCA	3105
522	GGCACCCA G	CACGCGAU	1193	AUGCGGUG	GCCGAAAGCGAGUCAAGGUCU	UGGGUGCC	3106
527	CCAGCAGG G	CAUCGCGC	1194	GCGCGAUG	GCCGAAAGCGAGUCAAGGUCU	CGUGCUGG	3107
534	GGCAUUCG G	CUGCCCCU	1195	AGGGGCG	GCCGAAAGCGAGUCAAGGUCU	CAGAGGCC	3108
548	CUUGCGCA G	CGCGCUGG	1196	CCAGGCCG	GCCGAAAGCGAGUCAAGGUCU	UGGCGAGG	3109
551	CGCGAGCG G	CUUGGGGG	1197	CCCCCAGG	GCCGAAAGCGAGUCAAGGUCU	CGCUGCGC	3110
560	CCUUGGGG G	CGCCCCCC	1198	GGGGGGCG	GCCGAAAGCGAGUCAAGGUCU	CCCCCAGG	3111
573	CCCCUGGG G	CUGCGGCU	1199	AGCCCGAG	GCCGAAAGCGAGUCAAGGUCU	CCCCGGGG	3112
579	GGGCUUGG G	CUGCCCCG	1200	CGGGGCG	GCCGAAAGCGAGUCAAGGUCU	CAGAGCCC	3113
603	GAGCAAGA G	CCCGAGGA	1201	UCCUCCGG	GCCGAAAGCGAGUCAAGGUCU	UCCUUGUC	3114
612	CCCGAGCA G	CCCGGCGG	1202	CGGCGGG	GCCGAAAGCGAGUCAAGGUCU	UCCUGGGG	3115
617	GGAGCCCC G	CGGAGGGG	1203	CCUUCGGG	GCCGAAAGCGAGUCAAGGUCU	CGGGGCGC	3116
626	CGGAGAGG G	CAGCUUUG	1204	CAAGAGCUG	GCCGAAAGCGAGUCAAGGUCU	CCUUCGGG	3117
629	GAGGGGCA G	CUUUGUGG	1205	CCACAAAG	GCCGAAAGCGAGUCAAGGUCU	UGCCCCUC	3118
643	UGGAUGAG G	UGGACCA	1206	GUUGUCCA	GCCGAAAGCGAGUCAAGGUCU	CAUCUCCA	3119
659	CCUAGAGG G	CAAGUCGG	1207	CCGACUUG	GCCGAAAGCGAGUCAAGGUCU	CCUUCAGG	3120

Table 21

663	AGGGGCAA	G	UCGGGGCA	1208	UGCCCCGA	GCCGAAAGGCGAGUCAAGGUCU	UUGCCCCU	3121
669	AAGUCGGG	G	CAGGGCUA	1209	UAGCCCCU	GCCGAAAGGCGAGUCAAGGUCU	CCCAGCUU	3122
674	GGGGCAGG	G	CUACUACG	1210	CGUAGUAG	GCCGAAAGGCGAGUCAAGGUCU	CCUGCCCC	3123
682	GUACUACG	G	UGGAGAUU	1211	CAUCUCCA	GCCGAAAGGCGAGUCAAGGUCU	GUAGUAGC	3124
694	AGAUAGCC	G	UGGGCAGC	1212	GCUGCCCC	GCCGAAAGGCGAGUCAAGGUCU	GUUCUAUCU	3125
698	GACCGUGG	G	CAGCCCCC	1213	GGGGGCUU	GCCGAAAGGCGAGUCAAGGUCU	CCACGGUC	3126
701	CGUGGGCA	G	CCCCCCCC	1214	GCGGGGGG	GCCGAAAGGCGAGUCAAGGUCU	UGCCCCCG	3127
727	ACAUCCUG	G	UGGAUACA	1215	UGUAUCCA	GCCGAAAGGCGAGUCAAGGUCU	CAGGAUUG	3128
737	GSUAUACG	G	GCAGAUUA	1216	UACUGCUG	GCCGAAAGGCGAGUCAAGGUCU	CGUAUACC	3129
740	UACAGGCA	G	CAGUAAUC	1217	AGUUAUCU	GCCGAAAGGCGAGUCAAGGUCU	UGCCUGUA	3130
743	AGGCAGCA	G	UAACUUUG	1218	CAAGAUUA	GCCGAAAGGCGAGUCAAGGUCU	UGCUCCUG	3131
754	ACTUUGAG	G	UGGGUGCU	1219	AGCACCCA	GCCGAAAGGCGAGUCAAGGUCU	UGCAAAAGU	3132
758	UGCAGUGG	G	UGCUGCCC	1220	GGGCAGCA	GCCGAAAGGCGAGUCAAGGUCU	CCACUGCA	3133
798	UACCAGAG	G	CAGCGUUC	1221	GACAGCUG	GCCGAAAGGCGAGUCAAGGUCU	CUCUGGUA	3134
801	CAGAGGCA	G	CUUCCAG	1222	CUGGACAG	GCCGAAAGGCGAGUCAAGGUCU	UGCCUUCU	3135
809	CGUCUCCA	G	CACAUAUC	1223	GGUAUGUG	GCCGAAAGGCGAGUCAAGGUCU	UGGACAGG	3136
833	CCGGAAGG	G	UGUGUAUG	1224	CAUACACA	GCCGAAAGGCGAGUCAAGGUCU	CCUUCGGG	3137
857	CACCCAGG	G	CAAGUGGG	1225	CCCACUUG	GCCGAAAGGCGAGUCAAGGUCU	CCUGGGUG	3138
861	CAGGGGAG	G	UGGGAAGG	1226	CCUUCCCA	GCCGAAAGGCGAGUCAAGGUCU	UUGCCCCU	3139
873	GAAGGGAG	G	CUGGGCAC	1227	GUUGCCAG	GCCGAAAGGCGAGUCAAGGUCU	UCCCCUUC	3140
878	GGAGCUGG	G	CACCGACC	1228	GGUCGGUG	GCCGAAAGGCGAGUCAAGGUCU	CCAGCUCC	3141
889	CCGACCGG	G	UAAGUAUC	1229	GAUUCUUA	GCCGAAAGGCGAGUCAAGGUCU	CAGGUCGG	3142
893	CCUGGUAA	G	CAUCCCCC	1230	GCGGGAGU	GCCGAAAGGCGAGUCAAGGUCU	UUAACAGG	3143
905	CCCCCAUG	G	CCCAACAG	1231	CGUUGGGG	GCCGAAAGGCGAGUCAAGGUCU	CAUGGGGG	3144
913	GCCCCAAC	G	UCACUGUG	1232	CACAGUGA	GCCGAAAGGCGAGUCAAGGUCU	GUUGGGGC	3145
923	CACUCUGC	G	UGCCAAAC	1233	UGUUGGCA	GCCGAAAGGCGAGUCAAGGUCU	GCACAGUG	3146
957	UCAGACAA	G	UUCUUAU	1234	AUGAAGAA	GCCGAAAGGCGAGUCAAGGUCU	UUGUCUAU	3147
971	CAUCAACG	G	CUCCAACU	1235	AGUUGGAG	GCCGAAAGGCGAGUCAAGGUCU	CGUUGAUG	3148
986	CUGGGAGG	G	CAUCCUGG	1236	CCAGGAUG	GCCGAAAGGCGAGUCAAGGUCU	CUUCCAGC	3149
996	AUCCUGGG	G	CUGGCCUA	1237	UAGGCCAG	GCCGAAAGGCGAGUCAAGGUCU	CCACAGAU	3150
1000	UGGGGCUU	G	CCUAUUCU	1238	AGCAUAGG	GCCGAAAGGCGAGUCAAGGUCU	CAGCCCCA	3151
1020	AUUGCCAG	G	CCUGACGA	1239	UGUCACGG	GCCGAAAGGCGAGUCAAGGUCU	CUUGCBAU	3152
1038	UCCUCGGA	G	CCUUAUCU	1240	AAGAAGAG	GCCGAAAGGCGAGUCAAGGUCU	UCCAGGGA	3153
1057	ACUCUCUG	G	UAGGACAG	1241	CUUCUUAU	GCCGAAAGGCGAGUCAAGGUCU	CAGAGAGU	3154
1062	CUGGUAAA	G	CAGACCCA	1242	UGGGUCUG	GCCGAAAGGCGAGUCAAGGUCU	UUUACAGC	3155
1072	AGACCCAC	G	UCCCCAAC	1243	GUUGGGAA	GCCGAAAGGCGAGUCAAGGUCU	GUUGGUCU	3156
1095	UCCUCUGG	G	CUUUGGGG	1244	CCACAAGG	GCCGAAAGGCGAGUCAAGGUCU	UGCAGGGA	3157
1103	GCUUUGUG	G	UGCUUGGU	1245	AGCCAGCA	GCCGAAAGGCGAGUCAAGGUCU	CACAAAGC	3158
1109	UGUUGCUG	G	CUUCCCCC	1246	GGGGGAAG	GCCGAAAGGCGAGUCAAGGUCU	CAGCACCA	3159
1125	CUCAACCA	G	UCUGAAAG	1247	ACUUCAGA	GCCGAAAGGCGAGUCAAGGUCU	UGGUUAGG	3160
1132	AGUCUGAA	G	UGCUGGGC	1248	GGCCAGCA	GCCGAAAGGCGAGUCAAGGUCU	UUCACAGU	3161
1138	AAGUGUGG	G	CUUUGUUC	1249	GACAGAGG	GCCGAAAGGCGAGUCAAGGUCU	CAGCAUUC	3162
1154	CGAGGGGA	G	CAUAGUAC	1250	UGAUCAUG	GCCGAAAGGCGAGUCAAGGUCU	UCCUCGCG	3163
1169	CAUUGGAG	G	UAUCCACC	1251	GGUCGAUA	GCCGAAAGGCGAGUCAAGGUCU	UCCUAUAG	3164
1193	GUACACAG	G	CAGUCUCU	1252	AGAGACUG	GCCGAAAGGCGAGUCAAGGUCU	CUUGUUAU	3165
1196	CACAGGCA	G	UCUCUGUG	1253	ACCAAGAG	GCCGAAAGGCGAGUCAAGGUCU	UGCCUGUG	3166
1203	AGUCUCUG	G	UAUAACAC	1254	GGUGUAUA	GCCGAAAGGCGAGUCAAGGUCU	CAGAGAGU	3167
1218	CCCAUCCG	G	CGGGAGUG	1255	CACUCCCG	GCCGAAAGGCGAGUCAAGGUCU	CGGAUGGG	3168
1224	CGGCGGGG	G	UGGUUAUA	1256	UAUAUCCA	GCCGAAAGGCGAGUCAAGGUCU	UCCCGCGC	3169
1227	CGGGAGUG	G	UAUUAUGA	1257	UCAUAUUA	GCCGAAAGGCGAGUCAAGGUCU	CACUCCCG	3170
1237	AUUAUUGG	G	UGAUCAU	1258	AAUGAUCA	GCCGAAAGGCGAGUCAAGGUCU	CUCAUAU	3171

Table 21

1252	UUGUGCGG G UGGAGAUC	1259	GAUCUCCA GCCGAAAGGCGAGUCAAGGUCU	CGGCACAA	3172
1293	UGCAAGGA G UACAACUA	1260	UAGUUGUA GCCGAAAGGCGAGUCAAGGUCU	UCCUUGCA	3173
1310	UGACAGGA G CAUUGUGG	1261	CCACAAGU GCCGAAAGGCGAGUCAAGGUCU	UCUUGUCA	3174
1322	UGUGGACA G UGGCACCA	1262	UGGUGCCA GCCGAAAGGCGAGUCAAGGUCU	UGUUCACA	3175
1325	GGACAGUG G CACCAACA	1263	UGUGGUGG GCCGAAAGGCGAGUCAAGGUCU	CACUGUCC	3176
1340	CAACCUUC G UUUGCCCA	1264	UUGGCAAA GCCGAAAGGCGAGUCAAGGUCU	GAAGGUGU	3177
1354	CCAGAGAA G UGUUUUGA	1265	UUCACACA GCCGAAAGGCGAGUCAAGGUCU	UUUCUUGG	3178
1363	UGUUGUAA G CUGCAUUC	1266	GAUCUGAG GCCGAAAGGCGAGUCAAGGUCU	UUGAAAAA	3179
1369	AAGCUGUA G UCAAAUCC	1267	GGAUUUUA GCCGAAAGGCGAGUCAAGGUCU	UGCAGUCU	3180
1384	CCAUCAAG G CAGCCUCC	1268	GGAGGUGG GCCGAAAGGCGAGUCAAGGUCU	CUUGAUGG	3181
1387	UCAAAGCA G CCUCCUCC	1269	GGAGGAGG GCCGAAAGGCGAGUCAAGGUCU	UGCCUUGA	3182
1404	ACGAGAGAA G UUCCUGUA	1270	UCAGGGAU GCCGAAAGGCGAGUCAAGGUCU	UUUCUCCU	3183
1415	CCCUCAUG G UUUCUGCG	1271	GCCAGAAA GCCGAAAGGCGAGUCAAGGUCU	CAUCAGGG	3184
1422	GGUUCUUG G CUAGAGAA	1272	UCUCCUAG GCCGAAAGGCGAGUCAAGGUCU	CAGAAAAC	3185
1431	CUAGGAGA G CAGCUGGU	1273	ACCAGCUG GCCGAAAGGCGAGUCAAGGUCU	UUUCUAGG	3186
1434	GGAGAGCA G CUGUGUGG	1274	CACACCAG GCCGAAAGGCGAGUCAAGGUCU	UGCUUCCA	3187
1438	AGCAGAGG G UUGUCUGG	1275	CCAGCACA GCCGAAAGGCGAGUCAAGGUCU	CAGCUGCU	3188
1446	GUGUGUGG G CAAGCAAG	1276	CCUGCUGG GCCGAAAGGCGAGUCAAGGUCU	CAGCACAC	3189
1450	GCUGGCAA G CAGGCAAC	1277	GGUGCCUG GCCGAAAGGCGAGUCAAGGUCU	UGGCGCAG	3190
1454	GCAAGCAG G CACCACCC	1278	GGUGUGUG GCCGAAAGGCGAGUCAAGGUCU	CUGCUUCC	3191
1480	UUUUCCCA G UCAUCCUA	1279	UGAGAUGA GCCGAAAGGCGAGUCAAGGUCU	UGGGAATA	3192
1502	CCUAUUGG G UGAGGUUA	1280	UAACTUCA GCCGAAAGGCGAGUCAAGGUCU	CCAUAAGG	3193
1507	UGGGUGAG G UUAACAAC	1281	GUGUGUAA GCCGAAAGGCGAGUCAAGGUCU	CUCACCCA	3194
1518	ACCAACCA G UCCUUCGG	1282	CGGAAGGA GCCGAAAGGCGAGUCAAGGUCU	UGGUGUGU	3195
1545	CUUCCGCA G CAUAUCCU	1283	AGGUUAUG GCCGAAAGGCGAGUCAAGGUCU	UGCGGAAG	3196
1557	UACCCGCG G CCAUGUGA	1284	UCCACUGG GCCGAAAGGCGAGUCAAGGUCU	CGCAGGUA	3197
1561	UQCQGCCA G UGGAAGAU	1285	AUUCUCCA GCCGAAAGGCGAGUCAAGGUCU	UGGCCGCA	3198
1573	AAGAUGUG G CCAAGUCC	1286	GGACUGGG GCCGAAAGGCGAGUCAAGGUCU	CACAUCUU	3199
1578	GUGGCCAC G UCCCAAGA	1287	UCUUGGGA GCCGAAAGGCGAGUCAAGGUCU	GUGGCCAC	3200
1599	UGUUAACA G UUUGCCAU	1288	AUGGCAAA GCCGAAAGGCGAGUCAAGGUCU	UUUUAACA	3201
1614	AUUCACCA G UCAUCCAC	1289	GUGGAUGA GCCGAAAGGCGAGUCAAGGUCU	UGUGAGAU	3202
1625	AUCCACGG G CACUUAUA	1290	UAACAGUG GCCGAAAGGCGAGUCAAGGUCU	CCUGUGAU	3203
1639	UUUUGGGA G CUGUUAUC	1291	GAUUAACG GCCGAAAGGCGAGUCAAGGUCU	UCCCAUAA	3204
1655	CAUGGAAG G UUCUACGG	1292	CGUAGAAG GCCGAAAGGCGAGUCAAGGUCU	CCUCCUAG	3205
1663	GCUCUACG G UUGUCUUU	1293	AAGAGCAA GCCGAAAGGCGAGUCAAGGUCU	GUAGAAGC	3206
1678	UUUGAUCGG G CCCGAAAA	1294	UUUUCGGG GCCGAAAGGCGAGUCAAGGUCU	CCGAUCAA	3207
1694	ACGAUUGG G CUUUGCUG	1295	CAGCAAGG GCCGAAAGGCGAGUCAAGGUCU	CAAUUCGU	3208
1706	UGCUGUCA G CGCUGGCC	1296	GGCAAGCG GCCGAAAGGCGAGUCAAGGUCU	UGACAGCA	3209
1728	CACGAUGA G UUCAGAAC	1297	GUCCUGAA GCCGAAAGGCGAGUCAAGGUCU	UGAUCUGG	3210
1738	UCAGGACG G CAGCGGAG	1298	CACCGCUG GCCGAAAGGCGAGUCAAGGUCU	CGUCUUGA	3211
1741	GGACGGCA G CGUGGGAU	1299	UUCACCCG GCCGAAAGGCGAGUCAAGGUCU	UGCCUCCU	3212
1744	CGGCAAGG G UGGAAGGC	1300	GCCUUECA GCCGAAAGGCGAGUCAAGGUCU	CGUGCCCG	3213
1751	GUUGGAAG G CCUCUUUG	1301	CAAAAGGG GCCGAAAGGCGAGUCAAGGUCU	CUUCCACC	3214
1784	AGACUGUG G UUCAACAA	1302	UGUUGUAG GCCGAAAGGCGAGUCAAGGUCU	CACAGUCC	3215
1809	ACAGAUGA G UCAACCCU	1303	AGGGUUGA GCCGAAAGGCGAGUCAAGGUCU	UCAUCUGU	3216
1828	UGACCAUA G CCUAUUGG	1304	GACAUAGG GCCGAAAGGCGAGUCAAGGUCU	UAUGUGUA	3217
1840	AUGCAUUG G UGCACAU	1305	GAUGGCAG GCCGAAAGGCGAGUCAAGGUCU	CAUGACAU	3218
1882	GCCUCAUG G UGUUGCAG	1306	CUGACACA GCCGAAAGGCGAGUCAAGGUCU	CAUAGGCG	3219
1890	GUGUGUCA G UGGCGCUG	1307	CAGCGCCA GCGAAAGGCGAGUCAAGGUCU	UGACACAC	3220
1893	UGUCAGUG G CGCUGCCU	1308	AGGCAGCG GCCGAAAGGCGAGUCAAGGUCU	CACUGACA	3221
1917	CUUGCCCA G CAGCAUGA	1309	UCAUUCUG GCCGAAAGGCGAGUCAAGGUCU	UGGCGCAG	3222

Table 21

1920	CGCCAGCA G CAUGAUGA	1310	UCAUCAUG GCCGAAAGGCGAGUCAAGGUUCU UGCUGGCG	3223
1956	CUGCUGAA G UGAGGAGG	1311	CCUCCUCA GCCGAAAGGCGAGUCAAGGUUCU UUCAGCAG	3224
1964	GUGAGGAG G CCCAUGGG	1312	CCCAUGGG GCCGAAAGGCGAGUCAAGGUUCU CUCCUCAC	3225
1972	GCCCAUGG G CAGAAGAU	1313	AUCUUCUG GCCGAAAGGCGAGUCAAGGUUCU CCAUGGGC	3226
2006	ACACCUCC G UGUUUCAC	1314	GUGAACCA GCCGAAAGGCGAGUCAAGGUUCU GGAGGUUG	3227
2009	CCUCCUGG G UUCACUUU	1315	AAAGUGAA GCCGAAAGGCGAGUCAAGGUUCU CACGAGG	3228
2019	UCACUUGG G UCAACAAGU	1316	ACUUGUGA GCCGAAAGGCGAGUCAAGGUUCU CAAAGUGA	3229
2026	GGUCACAA G UAGGAGAC	1317	GUCUCCUA GCCGAAAGGCGAGUCAAGGUUCU UUGUACCC	3230
2042	CACAGAUG G CACCUUUG	1318	CACAGGUG GCCGAAAGGCGAGUCAAGGUUCU CAUCUGUG	3231
2051	CACCUUGG G CCAGAGCA	1319	UGCUCUGG GCCGAAAGGCGAGUCAAGGUUCU CACAGGUG	3232
2057	UGGCCAGA G CACUCUAG	1320	CUGAGGUG GCCGAAAGGCGAGUCAAGGUUCU UCUGGCCA	3233
2114	AGGAAAGG G CUGGCAAG	1321	CUUGCCAG GCCGAAAGGCGAGUCAAGGUUCU CUUUUCCU	3234
2118	AAAGGCGU G CAAGGUGG	1322	CCACCUUG GCCGAAAGGCGAGUCAAGGUUCU CAGCCUUG	3235
2123	CUGGCAAG G UGGGUUCC	1323	GGAACCCA GCCGAAAGGCGAGUCAAGGUUCU CUUGCCAG	3236
2127	CAAGGUGG G UUCACAGG	1324	CCUUGGAA GCCGAAAGGCGAGUCAAGGUUCU CCACCUUG	3237
2172	AGRAAGAA G CACUCUGC	1325	GCAGAGUG GCCGAAAGGCGAGUCAAGGUUCU UUCUUUUG	3238
2183	CUUGGCGU G CGGGAUUA	1326	UAUUCCCG GCCGAAAGGCGAGUCAAGGUUCU CAGCAGAG	3239
2198	UACUCUUG G UACCCUCA	1327	UGAGGUGA GCCGAAAGGCGAGUCAAGGUUCU CAAGAGUA	3240
2214	AAAUUUAA G UCGGGAAA	1328	UUUCCCGA GCCGAAAGGCGAGUCAAGGUUCU UUAUUUUA	3241
2243	AAACUUAU G CCGUGAAC	1329	GUUCACGG GCCGAAAGGCGAGUCAAGGUUCU UGAAGUUU	3242
2288	AACCCAAA G UAUUCUUC	1330	GAAGAAUA GCCGAAAGGCGAGUCAAGGUUCU UUUGGGUU	3243
2305	UUUUUUUA G UUUCAGAA	1331	UUCUGAAA GCCGAAAGGCGAGUCAAGGUUCU UAAAGAAA	3244
2314	UUUCAGAA G UACUGGCA	1332	UGCCAGUA GCCGAAAGGCGAGUCAAGGUUCU UUCUGAAA	3245
2320	AAGUACUG G CAUCACAC	1333	GUGUGAUG GCCGAAAGGCGAGUCAAGGUUCU CAGUACUU	3246
2333	ACACGCGG G UUAACCUUG	1334	CAAGGUUA GCCGAAAGGCGAGUCAAGGUUCU CUGCGUGU	3247
2342	UUACCUUG G CGUGUGUC	1335	GACACACG GCCGAAAGGCGAGUCAAGGUUCU CAAGGUUA	3248
2344	ACCUUGGC G UGUUGUCC	1336	GGGACACA GCCGAAAGGCGAGUCAAGGUUCU GCCAAGGU	3249
2357	UCCCUUGG G UACCCUUG	1337	CCAGGGUA GCCGAAAGGCGAGUCAAGGUUCU CACAGGGA	3250
2365	GUACCCUG G CAGAGAAG	1338	CUUCUCUG GCCGAAAGGCGAGUCAAGGUUCU CAGGGUAC	3251
2381	GAGACCAA G CUUGUUUC	1339	GAAACAAG GCCGAAAGGCGAGUCAAGGUUCU UUGGUCUC	3252
2397	CCUUGUGG G CCAAGUUC	1340	GACUUUGG GCCGAAAGGCGAGUCAAGGUUCU CAGCAGGG	3253
2403	UGGCCAAA G UCAGUAGG	1341	CCUACUGA GCCGAAAGGCGAGUCAAGGUUCU UUUGGCCA	3254
2407	CAAGUGCA G UAGGAGAG	1342	CUCUCCUA GCCGAAAGGCGAGUCAAGGUUCU UGACUUUG	3255
2424	GAUGCACA G UUUUGCAU	1343	AUAGCAAA GCCGAAAGGCGAGUCAAGGUUCU UUGCAUUC	3256
2463	AUAAACAA G CCUACAAC	1344	AUGUUUAG GCCGAAAGGCGAGUCAAGGUUCU UUGUUUUA	3257
2474	UAACAUGG G UGCAAGA	1345	UCUUUGCA GCCGAAAGGCGAGUCAAGGUUCU CAUUGUUA	3258

Input Sequence = AF190725. Cut Site = G/.

Stem Length = 8. Core Sequence = GCgaaagGCGaGCaagGuCu

AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 22

Table 22: Human BACE DNase and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
48	GCUGGAU A UGGUGGCC	3	GGCCACCA GGCTAGCTACAACGA AATCCAGC	3259
677	GCAGGGCU A CUACGUUG	27	CCACGTAG GGCTAGCTACAACGA AGCCCTGC	3260
680	GGGCUACU A CGUGGAGA	28	TCTCCACG GGCTAGCTACAACGA AGTAGCCC	3261
733	UGGUGGAU A CAGGACAG	31	GCTGCCTG GGCTAGCTACAACGA ATCCACCA	3262
788	GCAUCGU A CUACAGA	38	TCTGGTAG GGCTAGCTACAACGA AGCGATGC	3263
791	UCGCUACU A CCAGAGCG	39	GCCTCTGG GGCTAGCTACAACGA AGTAGCGA	3264
815	CAGCACAU A CCGGGACC	41	GGTCCCGG GGCTAGCTACAACGA ATGTCTGT	3265
839	GGGUGUGU A UGUGCCCU	43	AGGSCACA GGCTAGCTACAACGA ACACACCC	3266
848	UGUGCCCU A CACCCAGG	44	CCTGGGTG GGCTAGCTACAACGA AGGCCACA	3267
1004	GCUGGCCU A UGUGGAGA	58	TCTCAGCA GGCTAGCTACAACGA AGCCAGCC	3268
1171	UUGGAGGU A UCGACCAC	85	TGTGTCGA GGCTAGCTACAACGA ACCTCCAA	3269
1187	CUCGCGU A CACAGGCA	88	TGCTGTGT GGCTAGCTACAACGA ACAGCGAG	3270
1205	UCUCUGGU A UACACCCA	91	TGGGTGTA GGCTAGCTACAACGA ACCAGAGA	3271
1207	UCUCUGAU A CACCAUCC	92	GATGGGTG GGCTAGCTACAACGA ATACCAGA	3272
1229	GGAGUGGU A UUAUGAGG	94	CCTCATAA GGCTAGCTACAACGA ACCACTCC	3273
1232	GUUGAUU A UAGGUGUA	96	TCACCTCA GGCTAGCTACAACGA AATACACC	3274
1295	CAAGGAGU A CACAUUUG	101	CATAGTTG GGCTAGCTACAACGA ACTCTCTG	3275
1301	GUACAACU A UGACAAGA	102	TCTTGTC A GGCTAGCTACAACGA AGTGTATC	3276
1493	CUCACUCU A CCUAUUGG	130	CCATTAGG GGCTAGCTACAACGA AGAGTGAG	3277
1510	GUUGAGGU A CAAACACG	133	CTGTGTGG GGCTAGCTACAACGA AACCTCAC	3278
1550	GCAGCAAU A CCUGCGCC	141	GCCGCGAG GGCTAGCTACAACGA ATTGTCTG	3279
1595	GCACUGUU A CAAGUUUG	144	CAAACTTG GGCTAGCTACAACGA ACAGTGTG	3280
1633	GCACUGUU A UGGGAGCU	152	AGCTCCCA GGCTAGCTACAACGA AACAGTGC	3281
1645	GAGCUGUU A UCAUUGAG	154	CTCCATGA GGCTAGCTACAACGA AACAGCTC	3282
1661	GGGCUUCU A CGUUGUCU	158	AGACAACG GGCTAGCTACAACGA AGAAGCTC	3283
1787	CUGUGGCU A CAACAUCU	176	GAATGTTG GGCTAGCTACAACGA AGCCACAG	3284
1832	CAUAGCCU A UGUCAUUG	182	CAATGACA GGCTAGCTACAACGA AGGCTATG	3285
2141	GGGACUGU A CCUGUAGG	212	CCTACAGG GGCTAGCTACAACGA ACAGTCCC	3286
2191	GGGGAU A CUUUGUGU	215	ACCAAGAG GGCTAGCTACAACGA ATTCCCGC	3287
2290	CCCAAGU A UUCUUCUU	240	AAGAAGAA GGCTAGCTACAACGA ACTTTGGG	3288
2316	UCAGAGU A CUGGCAUC	254	GATGCCAG GGCTAGCTACAACGA ACTTCTGA	3289
2336	CGCAGGUU A CCUUGCGG	257	CGCCAAGG GGCTAGCTACAACGA AACCTGCG	3290
2359	CCUGUGGU A CCCUGGCA	260	TGCCAGGG GGCTAGCTACAACGA ACCACAGG	3291
2431	AGUUUGU A UUUUCUUU	269	AAAGCAAA GGCTAGCTACAACGA AGCAAACT	3292
2455	GGACUGU A UAAACAAG	275	CTTGTTTA GGCTAGCTACAACGA ACAGTCCC	3293
140	AGCCGCC A CCGGCCCG	322	CGGCGCGG GGCTAGCTACAACGA GCGGCTCT	3294
151	GGCCGCC A UGCCGCC	327	GGCGGGCA GGCTAGCTACAACGA GCGGGCC	3295
287	CGCUUCC A CAGCCCGG	380	CCGCGCTG GGCTAGCTACAACGA GGAAGCGG	3296
368	GAGAAGCC A CCAGCACC	412	GTTGCTGG GGCTAGCTACAACGA GGCTTCTC	3297
374	CCACGAG A CCACGAC	415	CTGGGTGG GGCTAGCTACAACGA GCTGTTGG	3298
377	CCAGCACC A CCAGACU	417	AGCTTGGG GGCTAGCTACAACGA GGTGCTGG	3299
451	CGGGGCC A CCAUGGCC	435	GGCCATGG GGCTAGCTACAACGA GGGCCCCG	3300
454	GGCCACCC A UGGCCCAA	437	TGGGCCCA GGCTAGCTACAACGA GGTGGGCC	3301
512	CCUGGCC A CGGACCC	456	GGGTGCCG GGCTAGCTACAACGA GGGCAGCG	3302
517	CGCCAGG A CCAGCAC	457	GTGCTGGG GGCTAGCTACAACGA GCGTGGG	3303
524	CACCCAGC A CGGCAUC	461	GGATGCCG GGCTAGCTACAACGA GCTGGGTG	3304
529	AGCACGGC A UCCGCGUG	462	CAGCCGGA GGCTAGCTACAACGA GCGTGGCT	3305

Table 22

721	CGCUCAAC A UCCUGGUG	508	CACCAGGA GGCTAGCTACAACGA GTTGAGCG	3306
770	UGCCCCCC A CCCCUGCC	522	GGAAGGGG GGCTAGCTACAACGA GGGGGGCA	3307
782	CUUCCUGG A UCGCUACU	529	AGTAGTGA GGCTAGCTACAACGA GCAGGAAG	3308
811	UGUCGAGC A CAUACCGG	538	CCGGTATG GGCTAGCTACAACGA GCTGGACA	3309
813	UCCAGCAC A UACCGGGA	539	TCCCGGTA GGCTAGCTACAACGA GTGCTGGA	3310
850	UGCCCUAC A CCCAGGGC	547	GCCTGGG GGCTAGCTACAACGA GTTGGGCA	3311
880	AGCUGGGC A CGAGCCUG	553	CAGTTCGG GGCTAGCTACAACGA GCGGAGCT	3312
895	UGUUAAGC A UCCCCCAU	557	ATGGGGGA GGCTAGCTACAACGA GCTTACCA	3313
902	GAUCCCCC A UGCGCCCA	562	TGGGGGCA GGCTAGCTACAACGA GGGGGATG	3314
916	CCAACGUC A CUGUGCGU	567	ACGCACAG GGCTAGCTACAACGA GAGCTTGG	3315
931	UGGCCAAC A UUGCUGCC	571	GGCAGCAA GGCTAGCTACAACGA GTTGGCAC	3316
940	UUGCUGGC A UCACTGAA	574	TTCAGTGA GGCTAGCTACAACGA GGCAGCAA	3317
943	CUGCCAUU A CUGAUAUC	575	GTATTGAG GGCTAGCTACAACGA GATGGGAG	3318
964	AGUUCUUC A UCAACGGC	580	GCCCTTGA GGCTAGCTACAACGA GAAGAAGT	3319
988	GGGAAGGC A UCCUGGGG	586	CCCCAGGA GGCTAGCTACAACGA GCCTTCCC	3320
1070	GCAGACCC A CGUUGCCA	610	TGGGAAGC GGCTAGCTACAACGA GGGCTCCG	3321
1156	GAGGGAGC A UGAUUAU	638	AATGATCA GGCTAGCTACAACGA GCTCCCTC	3322
1162	GAUUAUUC A UUGGAGGU	639	ACCTCCAA GGCTAGCTACAACGA GATCATCG	3323
1178	UAUUGACC A CCGGCUU	641	ACAGCGAG GGCTAGCTACAACGA GGTGCGTA	3324
1189	CGCUGUAC A CAGGCAU	644	ACTGCCTG GGCTAGCTACAACGA GTACAGGG	3325
1209	UGGUUAUC A CCAUCCG	649	CGGATGGG GGCTAGCTACAACGA GTATACCA	3326
1213	ATACACCC A UCGGGCGG	652	CCGCGGGA GGCTAGCTACAACGA GGGTGTAT	3327
1243	AGUUAUUC A UUGUGCGG	654	CCGACGAA GGCTAGCTACAACGA GATCACTC	3328
1312	ACAAAGGC A UUGUGGAC	663	GTCCACAA GGCTAGCTACAACGA GCTCTTGT	3329
1327	ACAGUGGC A CCAACCAAC	665	GTGCTGGG GGCTAGCTACAACGA GCCACTGT	3330
1330	GUGGACCC A CCAACCUU	667	AAGGTTGG GGCTAGCTACAACGA GGTGCCAC	3331
1378	UCAAAUCC A UCAAGGCA	679	TGCTTGA GGCTAGCTACAACGA GGATTGGA	3332
1396	CUUCCUCC A CGGAGAG	687	CTTCTCCG GGCTAGCTACAACGA GGAGGAGG	3333
1456	AAGCAGGC A CACCCCCU	698	AGGGGTGG GGCTAGCTACAACGA GCTTGCIT	3334
1459	CAGGCACC A CCCCUGG	700	CCAAGGGG GGCTAGCTACAACGA GGTGCTCG	3335
1471	CUUGGAAC A UUUUCCCA	705	TGGGAAAA GGCTAGCTACAACGA GTTCCAAG	3336
1483	UCCAGGUC A UCUCACUC	709	GAGTGAGA GGCTAGCTACAACGA GACTGGGA	3337
1488	GUCAUCUC A CUUACCU	711	AGGTAGAG GGCTAGCTACAACGA GAGATGAC	3338
1528	CCUUCGCG A UCAACCAUC	723	GATGGTGA GGCTAGCTACAACGA GCGGAAGG	3339
1531	UCCGCAUC A CCAUCCUU	724	AAGATGGG GGCTAGCTACAACGA GATGGGGA	3340
1534	GCAUACCC A UCUUCCGG	726	CGGAAGGA GGCTAGCTACAACGA GGTGATGC	3341
1576	AUGUGGGC A CGUCCCAA	737	TGGGGAGG GGCTAGCTACAACGA GGCCACAT	3342
1606	AGUUGGCC A UCUCACAG	744	CTGTGAGA GGCTAGCTACAACGA GGCAAACT	3343
1611	GCAUCUUC A CAGUACUC	746	GATGACTG GGCTAGCTACAACGA GAGATGGC	3344
1617	UCACAGUC A UCCACGGG	748	CCCGTGGG GGCTAGCTACAACGA GACTGTGA	3345
1621	AGUACAUC A CGGGGACU	750	AGTGCCTG GGCTAGCTACAACGA GGATGACT	3346
1627	CCACGGGC A CUGUUAUG	751	CATAACAG GGCTAGCTACAACGA GCGGCTGG	3347
1648	CUUUAUUC A UGGAGGGC	754	GCCCTCCA GGCTAGCTACAACGA GATAACAG	3348
1715	CGUUGGCC A UGUACACG	765	CGTGACAA GGCTAGCTACAACGA GGAAGCGG	3349
1721	CCAUGUGC A CGUAUAGU	766	ACTCATGG GGCTAGCTACAACGA GCACATGG	3350
1762	CUUUGUUC A CCUUGGAC	772	GTCCAAGG GGCTAGCTACAACGA GACAAAAG	3351
1771	CTUUGGAC A UGGAAGAC	775	GTCTTCCA GGCTAGCTACAACGA GTCCAAGG	3352
1792	GCUACGAC A UUCACACG	779	CTGTGGAA GGCTAGCTACAACGA GTTGATGC	3353
1797	AACAUUCC A CAGACAGA	781	TCTGTCTG GGCTAGCTACAACGA GGAATGTT	3354
1819	CAACCCUC A UGACCAUA	788	TATGTCTA GGCTAGCTACAACGA GAGGGTTG	3355
1825	UCAUGACC A UAGCCUUA	790	ATAGGCTA GGCTAGCTACAACGA GGTGATGA	3356

Table 22

1837	CCUAGUC A UGCGGCC	793	GGCAGCCA GGCTAGCTACAACGA GACATAGG	3357
1846	UGGCTGCC A UCUUGGCC	796	GGCGCAGA GGCTAGCTACAACGA GGCAGCCA	3358
1861	CCCUUUC A UGCGGCCA	802	TGGCAGCA GGCTAGCTACAACGA GAGAGGGG	3359
1869	AUGCTGCC A CUCUGCCU	805	AGGCAGAG GGCTAGCTACAACGA GGCAGCAT	3360
1879	UCUGCCUC A UGGUGUGU	810	ACACACCA GGCTAGCTACAACGA GAGGCAGA	3361
1922	CCAGCAGC A UGAUGACU	822	AGTCATCA GGCTAGCTACAACGA GCTCTGG	3362
1942	CUGAUGAC A UCUCCUUG	825	CAGGGAGA GGCTAGCTACAACGA GCTATCAG	3363
1968	GGAGGCC A UGGGCAGA	833	TCTGCCA GGCTAGCTACAACGA GGGCTCC	3364
1998	CCUGAAC A CACUCCG	840	CGAGGTG GGCTAGCTACAACGA GACCAAG	3365
2000	UGGACCAC A CCUCGUG	841	CACGGAGG GGCTAGCTACAACGA GTGGTCCA	3366
2013	CGUGGUUC A CUUUGUUC	845	GACCAAG GGCTAGCTACAACGA GAACCAAG	3367
2022	CUUUGUUC A CAGUAGG	847	CCTACTTG GGCTAGCTACAACGA GAGCAAG	3368
2035	UAGGAGAC A CAGAUGGC	849	GGCATCTG GGCTAGCTACAACGA GTCTCTTA	3369
2044	CAGAUGGC A CCUGUGGC	851	GCCACAGG GGCTAGCTACAACGA GCCATCTG	3370
2059	GCCAGAGC A CCUCAGGA	856	TCCTGAGG GGCTAGCTACAACGA GCTCTGCG	3371
2076	CCUUCGCC A CCCACCA	866	TTGGTGGG GGCTAGCTACAACGA GGGGAGGG	3372
2080	CCCACGCC A CCAUAGC	869	GCATTGGG GGCTAGCTACAACGA GGTGGGG	3373
2174	AAAGAGAC A CUCUGUG	885	CAGCAGAG GGCTAGCTACAACGA GCTCTTT	3374
2201	UCUUGUUC A CCUCAAU	891	ACTTGAGG GGCTAGCTACAACGA GACCAAG	3375
2260	CUUUGUUC A CCAUCCU	906	AGGAATGG GGCTAGCTACAACGA GGAACAAG	3376
2263	UGUCCACC A UUUUUUA	908	TAAGAGAA GGCTAGCTACAACGA GGTGAGCA	3377
2322	GUACUGGC A CAGCAGC	922	CGGTGTGA GGCTAGCTACAACGA GGCAGTAC	3378
2325	CUUGCAUC A CAGCAGG	923	CCTGCGTG GGCTAGCTACAACGA GATGCCAG	3379
2327	GGCAUCAC A CGCAGUUG	924	AACCTGCG GGCTAGCTACAACGA GTGATGCC	3380
2421	GAGGAGGC A CAGUUGC	945	GCAAACTG GGCTAGCTACAACGA GCATCCTC	3381
2470	AGCCUAC A UUGUGCA	954	TGCACCAA GGCTAGCTACAACGA GTTAGGCT	3382
11	AGCGUCC G CAGCCGC	960	CGGGCTGG GGCTAGCTACAACGA GGACCGGT	3383
18	CGCAGCCC G CCCGGAG	961	CTCCCGGG GGCTAGCTACAACGA GGGCTGGC	3384
29	CGGAGGCU G CGAGCCGC	962	CGCGCTGG GGCTAGCTACAACGA AGCTCCCG	3385
36	UGCGAGCC G CGAGCUGG	964	CCAGCTCG GGCTAGCTACAACGA GGCTGGCA	3386
69	CAGCAGAC G CAGCCGCA	967	TGCGGCTG GGCTAGCTACAACGA GTTGCTGG	3387
75	ACGCAGCC G CAGGAGCC	968	GGCTCTTG GGCTAGCTACAACGA GGCTGCTG	3388
94	GAGCCUUC G CCCUCCG	969	GGCAGGGG GGCTAGCTACAACGA AAGGGCTC	3389
100	UUGCCCC G CCCGCGC	970	GGCGGGGG GGCTAGCTACAACGA AGGGGCAA	3390
104	CCUGCCCC G CGCGCGG	971	CGCGGGGG GGCTAGCTACAACGA GGGCAGGG	3391
106	CGCGCGCG G CGCGCGC	972	GGCGGGGG GGCTAGCTACAACGA GCGGGCAG	3392
109	CUCGCGCG G CGCGCGC	973	GGCGGGGG GGCTAGCTACAACGA GCGCGGGG	3393
112	GGCGCGCG G CCCGCGG	974	CGCGGGGG GGCTAGCTACAACGA GGGCGGCG	3394
116	CGCGCGCG G CCGGGGG	975	CCCCGGGG GGCTAGCTACAACGA GGGCGGCG	3395
137	GGGAAGCC G CCAACGGC	976	GCCGCTGG GGCTAGCTACAACGA GGCTCTCC	3396
148	ACCGGCCC G CCAUGCCC	977	GGGCATGG GGCTAGCTACAACGA GGGCGGCT	3397
153	CGCGCGAU G CCGCGCCC	978	GGGGCGGG GGCTAGCTACAACGA ATGGCGGG	3398
157	CCAUGCCC G CCCUCCCC	979	GGGAGGGG GGCTAGCTACAACGA GGGCATGG	3399
172	CCAGCCCC G CCGGGAGC	980	GCTCCCGG GGCTAGCTACAACGA GGGGCTGG	3400
183	GGGAAGCC G CGCGCGCU	981	AGCGGGGG GGCTAGCTACAACGA GGGCTCCC	3401
185	GAGCCCGG G CCGCGCGC	982	GCAGCGGG GGCTAGCTACAACGA GCGGGCTC	3402
189	CGCGCGCC G CUCGCCAG	983	CTGGGCGG GGCTAGCTACAACGA GGGCGCGG	3403
192	CGCGCGCU G CCAAGGCU	984	AGCCTGGG GGCTAGCTACAACGA AGCGGGGG	3404
205	CGUGCGCC G CGCGCGG	985	CACGGCGG GGCTAGCTACAACGA GGGCAGCC	3405
208	UGCGCGCC G CGUGCGG	986	CGGCACGG GGCTAGCTACAACGA GCGCGCCA	3406
213	GGCGCGCU G CGAUGUA	987	TACATCGG GGCTAGCTACAACGA AGCGCGCG	3407

Table 22

250	UCUCUUU G	CUCUCCUG	989	CACGGGAG	GGCTAGCTACAACGA	AGGGGAGA	3408
258	GCUCUUU G	CUCUCCUG	990	CCGCAGAG	GGCTAGCTACAACGA	ACGGGAGC	3409
263	CGUGUUU G	CGGUAUUC	991	GAGATCCG	GGCTAGCTACAACGA	AGAGCAGG	3410
280	CCUGAGC G	CUCUCCAC	993	GTGGAGAG	GGCTAGCTACAACGA	GGTCAGGG	3411
320	AGGGCCU G	CAGGCCU	994	AGGGCCCTG	GGCTAGCTACAACGA	AGGGCCCT	3412
340	GUCUUAU G	CCGCCAAG	996	CTTGGGGG	GGCTAGCTACAACGA	ATCAGGAC	3413
397	GGGCAGG G	CCAGGGAC	998	GTCCCTGG	GGCTAGCTACAACGA	GCCTGCCC	3414
420	GGGCCAGU G	CGAGCCCA	999	TGGGCTCG	GGCTAGCTACAACGA	ACTGCGCC	3415
468	CAAGCCU G	CCUGCCU	1002	AGCCAGGG	GGCTAGCTACAACGA	AGCTCTTG	3416
480	UGGUCUU G	CUGUGGAU	1003	ATCCACAG	GGCTAGCTACAACGA	AGGAGCCA	3417
493	GAUGGGG G	CGGAGUG	1004	CACCTCCG	GGCTAGCTACAACGA	GCCATCC	3418
501	GGGGAGU G	CUGCCUG	1005	GCAGGCAG	GGCTAGCTACAACGA	ACTCCCGC	3419
504	GGAGUGU G	CCUGCCCA	1006	TGGGCAAG	GGCTAGCTACAACGA	AGCACTCC	3420
508	UGCUGGU G	CCACCGGC	1007	GCCTGGGG	GGCTAGCTACAACGA	AGCCAGCA	3421
537	AUCCGGG G	CCCUGCG	1008	CGCAGGGG	GGCTAGCTACAACGA	AGCCGGAT	3422
543	CGCCGCCU G	CCGACCGG	1009	CCGCTGGG	GGCTAGCTACAACGA	AGGGGCG	3423
545	GCCCCGG G	CAGCGGCC	1010	GGCCGCTG	GGCTAGCTACAACGA	GCAGGGGC	3424
562	UGGGGGG G	CCCCCUU	1011	CAGGGGGG	GGCTAGCTACAACGA	GCCCCCCA	3425
576	CGGGGGU G	CGCGUGCC	1012	GGCAGCGG	GGCTAGCTACAACGA	AGCCCTAG	3426
582	CUGCGGU G	CCCCGGGA	1013	TCCGGGGG	GGCTAGCTACAACGA	AGCCGCGA	3427
708	AGCCCCCC G	CAGACCCU	1019	AGCGTCTG	GGCTAGCTACAACGA	GGGGGGCT	3428
714	CCGCAGAG G	CUCACAU	1020	ATGTTGAG	GGCTAGCTACAACGA	GTCTGCGG	3429
751	GUAAUUU G	CAGUGGGU	1021	ACCACATG	GGCTAGCTACAACGA	AAAGTTAC	3430
760	CAGUGGU G	CGCGCCCC	1022	GGGGGCGA	GGCTAGCTACAACGA	AGCCACTG	3431
763	UGGGUGU G	CCCCCCAC	1023	GTGGGGGG	GGCTAGCTACAACGA	AGCCACCA	3432
780	CCCUUUU G	CAUCGCUA	1024	TAGCGATG	GGCTAGCTACAACGA	AGGAAGGG	3433
785	CCUGCAUC G	CUACUACC	1025	GGTAGTAG	GGCTAGCTACAACGA	GATGCAGG	3434
843	GUUGAUGU G	CCCUACAC	1026	GTGTAGGG	GGCTAGCTACAACGA	ACATACAC	3435
921	GUCAUUGU G	CGUGCCAA	1028	TTGGCAGG	GGCTAGCTACAACGA	ACAGTGAC	3436
925	CUGUGGU G	CCACCAUU	1029	AATGTTGG	GGCTAGCTACAACGA	AGCCACAG	3437
934	CCAACAUU G	CUGCCAUU	1030	GATGGCAG	GGCTAGCTACAACGA	AATGTTGG	3438
937	ACAUUGU G	CCAUACAU	1031	AGTGATGG	GGCTAGCTACAACGA	AGCAATGT	3439
1006	UGGCCUUA G	CUGAGAUU	1033	AATCTCAG	GGCTAGCTACAACGA	ATAGGCCA	3440
1015	CUGAGAUU G	CCAGGCCU	1035	AGGCCCTGG	GGCTAGCTACAACGA	AATCTCAG	3441
1092	UUUUUUU G	CAGCUUUG	1039	CAAAGCTG	GGCTAGCTACAACGA	AGGGAGAA	3442
1105	UUUGUGU G	CUGGCUUC	1040	GAAGCCAG	GGCTAGCTACAACGA	ACCACAAA	3443
1134	UUUGAAGU G	CUGGCCUC	1042	GAGGCCAG	GGCTAGCTACAACGA	ACTTCAGA	3444
1182	GACCAUUC G	CUGUACAC	1045	GTGTACAG	GGCTAGCTACAACGA	GAGTGTC	3445
1248	AUCAUUGU G	CGUGUGGA	1048	TCCACCGG	GGCTAGCTACAACGA	ACATGAT	3446
1286	AUUGAGU G	CAAGAGAU	1050	ACTCTCTG	GGCTAGCTACAACGA	AGTCATT	3447
1344	CUUCUUU G	CCCAAGAA	1052	TTCTTGGG	GGCTAGCTACAACGA	AAACGAAG	3448
1366	UUUAAGU G	CAGUCAAA	1054	TTTGACTG	GGCTAGCTACAACGA	AACTTCAA	3449
1442	CGUGUGU G	CUGGCCAG	1056	CTTGCCAG	GGCTAGCTACAACGA	ACACGAGC	3450
1526	GUCCUUCC G	CAUCACCA	1058	TGCTGATG	GGCTAGCTACAACGA	GGAGGAGC	3451
1542	AUCCUUCC G	CAGCAUUA	1059	TATTGCTG	GGCTAGCTACAACGA	GGAGGAT	3452
1554	CAUAUCCU G	CGGCCAGU	1060	ACTGGCCG	GGCTAGCTACAACGA	AGGTATTG	3453
1603	ACAAGUUU G	CCAUUCUA	1062	TGAGATGG	GGCTAGCTACAACGA	AAACTTGT	3454
1699	UUUGUUU G	CUGUGCAG	1066	GCTGACAG	GGCTAGCTACAACGA	AAAGCCAA	3455
1708	CUGUCAGC G	CUGGCCAU	1067	ATGGCAAG	GGCTAGCTACAACGA	GCTGACAG	3456
1712	CAGCGCUU G	CCAUUGUC	1068	GCACATGG	GGCTAGCTACAACGA	AGCCCTGT	3457
1719	UGCCAUU G	CAGCAUGA	1069	TCATCTGT	GGCTAGCTACAACGA	ACATGGCA	3458

Table 22

1843	UCAUGGCU G CCAUCUGC	1074	GCAGATGG GGCTAGCTACAACGA AGCCATGA	3459
1850	UGGCAUUC G CGCCUCUC	1075	AGAGGGCG GGCTAGCTACAACGA AGATGGCA	3460
1852	CCAUCUGC G CGCCUCUC	1076	GAAGAGGG GGCTAGCTACAACGA GCAATGGG	3461
1863	CUCUUCAU G CUGCCACU	1077	AGTGGCAG GGCTAGCTACAACGA ATGAAGAG	3462
1866	UUCAUUCU G CCAUCUCG	1078	CAGAGTGG GGCTAGCTACAACGA AGCATGAA	3463
1874	GCCAUCUC G CCUCAUGG	1079	CCATGAGG GGCTAGCTACAACGA AGAGTGGC	3464
1895	UCAGUGGC G CUGCCUCC	1080	GGAGGCAG GGCTAGCTACAACGA GGCCTGTA	3465
1898	GUGGCGCU G CCUCGCGU	1081	AGCGGAGG GGCTAGCTACAACGA AGCGCCAC	3466
1904	CUGCGUCC G CUGCCUCC	1082	GCAGGCAG GGCTAGCTACAACGA AGGAGCAG	3467
1907	CCUCGCGU G CCUGGCGC	1083	GGCGCAGG GGCTAGCTACAACGA AGCGGAGG	3468
1911	CGUGGUCU G CGCCAGCA	1084	TGCTGGGG GGCTAGCTACAACGA AGGCAGCG	3469
1913	CGCCUGGC G CGAGCAGC	1085	GCTGCTGG GGCTAGCTACAACGA GCAGGCAG	3470
1933	AUGACUUU G CUGAUGAC	1088	GTCATCAG GGCTAGCTACAACGA AAATCAT	3471
1950	AUUCUCCU G CUGAAGUG	1091	CACITCAG GGCTAGCTACAACGA AGGGAGAT	3472
2087	CACCAAAU G CCUCUGCC	1094	GGCAGAGG GGCTAGCTACAACGA ATTGTGGT	3473
2093	AUGCCUCU G CCUUGAUG	1095	CATCAAGG GGCTAGCTACAACGA AGAGGCAT	3474
2179	AGACUUCU G CUGGCGGG	1097	CCCGCCAG GGCTAGCTACAACGA AGAGTGCT	3475
2227	GAAGUUCU G CUGCUUGA	1098	TCAAGCAG GGCTAGCTACAACGA AGAATTC	3476
2230	AUUCUGCU G CUGGAAAC	1099	GTITCAAG GGCTAGCTACAACGA AGGAGAT	3477
2329	CAUCACAC G CAGGUUAC	1102	GTAACCTG GGCTAGCTACAACGA GTGTGATG	3478
2393	GUUUCUCC G CUGGCGAA	1103	TTGGCCAG GGCTAGCTACAACGA AGGGAAC	3479
2419	GAGAGGAU G CAGACUUU	1104	AAACTGTG GGCTAGCTACAACGA ATCTCTCT	3480
2428	CACAGUUU G CUUUAUUG	1105	GCAATAG GGCTAGCTACAACGA AAATGTGT	3481
2435	UGCUJAUU G CUUJAGAG	1106	CTCTAAG GGCTAGCTACAACGA AGAGTAT	3482
2476	ACAUUGGU G CAAAGAUU	1107	AACTTTTG GGCTAGCTACAACGA ACCAATGT	3483
2485	CRAAGAUU G CCUCUUGA	1108	TCAAGAGG GGCTAGCTACAACGA AATCTTTG	3484
219	GUGCCGAU G UAGCGGGC	1110	GCCCGCTA GGCTAGCTACAACGA ATCGGCAC	3485
483	CUCUCUCU G UGUUAGGG	1111	CCCATCCA GGCTAGCTACAACGA AGCAGGAG	3486
634	GCAGCUUU G UGGAAGUG	1112	CATCTCCA GGCTAGCTACAACGA AAAGCTGC	3487
804	AGGCAGCU G UCCAGCAC	1113	GTGCTGGA GGCTAGCTACAACGA AGCTGCTC	3488
835	GGAGAGGU G UGUUAGUG	1114	CACATACA GGCTAGCTACAACGA ACCCTTCC	3489
837	AAGGGUUG G UAUUGGCC	1115	GGCACATA GGCTAGCTACAACGA ACACCTTT	3490
841	GUGUGUAU G UGCGCUAC	1116	GTAGGGCA GGCTAGCTACAACGA ATACACAC	3491
919	ACGUCACU G UGCGUGCC	1117	GGCACGCA GGCTAGCTACAACGA AGTGACGT	3492
1100	GCAGCUUU G UGUGUGUG	1118	CAGCACCA GGCTAGCTACAACGA AAAGCTGC	3493
1144	UGGCUUCU G UCGGAGGG	1119	CCCTCGA GGCTAGCTACAACGA AGAGGCCA	3494
1185	CACUCGCU G UACACAGG	1120	CTGTGTGA GGCTAGCTACAACGA AGCGAGTG	3495
1245	UGAUCAUU G UGCGGGUG	1121	CACCGCA GGCTAGCTACAACGA AATGATCA	3496
1315	AGAGCAUU G UGGACAGU	1122	ACTGTCCA GGCTAGCTACAACGA AATGCTCT	3497
1356	AAGAAAGU G UUGAAGAG	1123	GCTTCAA GGCTAGCTACAACGA ACTTTCTT	3498
1440	CAGCUGGU G UGCUUGCA	1124	TGCCAGCA GGCTAGCTACAACGA ACCAGCTG	3499
1570	UGGAAGAU G UGGACACG	1125	CGTGCCA GGCTAGCTACAACGA ATCTTCCA	3500
1592	AGACGACU G UUAACAAG	1126	ACTTGTA GGCTAGCTACAACGA AGTCTGTT	3501
1630	CGGGCACU G UUAUGGGA	1127	TCCATAA GGCTAGCTACAACGA AGTGCCCG	3502
1642	UGGAGACU G UUAUCAUG	1128	CATGATAA GGCTAGCTACAACGA AGCTCCCA	3503
1666	UCUACGUU G UCUUUGAU	1129	ATCAAAGA GGCTAGCTACAACGA AACGTAGA	3504
1702	GCUUUGCU G UGAGGCGU	1130	AGCGCTGA GGCTAGCTACAACGA AGCAAGC	3505
1717	CUUGCCAU G UGCAAGAU	1131	ATCGTGA GGCTAGCTACAACGA ATGGCAAG	3506
1759	GCCUUUUU G UCACCUUG	1132	CAAGGTGA GGCTAGCTACAACGA AAAAGGCG	3507
1781	GGAGAGACU G UGGCUACA	1133	TGTAGCCA GGCTAGCTACAACGA AGCTTCC	3508
1834	UAGCCUAU G UCAUGGCU	1134	AGCCATGA GGCTAGCTACAACGA ATAGGCTA	3509

Table 22

1884	CUCAUGGU G UGUCAGUG	1135	CACCTGACA GGCTAGCTACAACGA ACCATGAG	3510
1886	CAUGGUGU G UGACUGGC	1136	GCCACTGA GGCTAGCTACAACGA ACACCATG	3511
2048	UGGCACCU G UGGCCAGA	1137	TCTGGCCA GGCTAGCTACAACGA AGGTGCCA	3512
2139	CAGGACU G UACUCUGA	1138	TACAGGTA GGCTAGCTACAACGA AGTCCCTG	3513
2145	CUGUACCU G UAGGAAC	1139	GTTTCCTA GGCTAGCTACAACGA AGGTACAG	3514
2256	GAACCUU G UCCACCAU	1140	ATGGTGGG GGCTAGCTACAACGA AAAGTTTC	3515
2346	CUUGGCGU G UGUCCUG	1141	CAGGGACA GGCTAGCTACAACGA ACGCCAG	3516
2348	UGGCGUGU G UCCUGUG	1142	CACAGGGA GGCTAGCTACAACGA ACAGGCCA	3517
2354	GUGUGACU G UUGUACCC	1143	GGGTACCA GGCTAGCTACAACGA AGTGACAC	3518
2385	CCAAGCUU G UUUCCUUG	1144	CAGGGAAA GGCTAGCTACAACGA AAGTTGG	3519
2453	CAGGGAU G UAUAAACA	1145	TGTTTATA GGCTAGCTACAACGA AGTCCCTG	3520
14	CGUCGCA G CCGGCCG	1146	CGGGCGGG GGCTAGCTACAACGA TCGCGAGC	3521
26	GCCCGGGA G CUGCGAGC	1147	GCTGCGAG GGCTAGCTACAACGA TCCCGGGC	3522
33	AGCUGCA G CCGCGAGC	1148	GCTGCGGG GGCTAGCTACAACGA TCGCAGCT	3523
40	AGCGCGCA G CUGGAUUA	1149	TAATCCAG GGCTAGCTACAACGA TCGCGGCT	3524
51	GGAAUUAU G UGGCCUGA	1150	TCAGGCCA GGCTAGCTACAACGA CATAATCC	3525
54	UUAUUGU G CUGAGACA	1151	TGCTAGG GGCTAGCTACAACGA CACCATAA	3526
60	UGGCGUGA G CCAACAAC	1152	GTTGGCTG GGCTAGCTACAACGA TCAGGCCA	3527
63	CCUGAGCA G CAGCAACA	1153	TGCGTTGG GGCTAGCTACAACGA TGCTCAGG	3528
72	CCAACGCA G CCGCAGGA	1154	TCCTGCGG GGCTAGCTACAACGA TGCTTGG	3529
81	CCGCAGGA G CCGGAGC	1155	GCTCCGGG GGCTAGCTACAACGA TCCCGGGC	3530
88	AGCCCGGA G CCGUGCC	1156	GGCAAGGG GGCTAGCTACAACGA TCCCGGCT	3531
134	CCAGGGAA G CCGCCACC	1157	GGTGGCGG GGCTAGCTACAACGA TCCCGGCT	3532
144	CGCCACCG G CCGGCAU	1158	ATGGCGGG GGCTAGCTACAACGA CGGTGGCG	3533
167	CCCUCCCA G CCGCGCG	1159	CGCGGGGG GGCTAGCTACAACGA TGGAGAGG	3534
179	CGCCGGGA G CCGCGGCC	1160	GGCGGGGG GGCTAGCTACAACGA TCCCGGGC	3535
198	CUGCCAG G CUGGCGC	1161	GCGGCCAG GGCTAGCTACAACGA CTGGGCG	3536
202	CCAGGCG G CCGCGCC	1162	GGCGGGGG GGCTAGCTACAACGA CAGCCTGG	3537
211	CCGCGCC G UGCGGAU	1163	CATCGGCA GGCTAGCTACAACGA GCGGCGG	3538
222	CCGAUGUA G CGGGCUCC	1164	GGAGCCCG GGCTAGCTACAACGA TACATCGG	3539
226	UGUAGCG G CCGCGAU	1165	ATCCGGAG GGCTAGCTACAACGA CCGCTACA	3540
239	GGAUCCCA G CCUCUCCC	1166	GGGAGAGG GGCTAGCTACAACGA TGGATCC	3541
256	CUGCUCCC G UGCUUGG	1167	GCAGAGCA GGCTAGCTACAACGA GGGAGCAG	3542
290	UCUCACA G CCGCGACC	1168	GGTCCGGG GGCTAGCTACAACGA TGTGGAGA	3543
304	ACCCGGGG G CUGGCCCA	1169	TGGGCCAG GGCTAGCTACAACGA CCCCGGGT	3544
308	GGGGGCG G CCGAGGCC	1170	GCCTGGGG GGCTAGCTACAACGA CAGCCCCC	3545
315	GGCCGAG G CCGUGCAG	1171	CTGCAGGG GGCTAGCTACAACGA CTTGGGCC	3546
324	CCUGCGAG G CCGUGCG	1172	CGCCAGGG GGCTAGCTACAACGA CTGCGGG	3547
330	AGGCGCUG G CGUUGCA	1173	TCAGGAGG GGCTAGCTACAACGA CAGGGCCT	3548
332	GCCUGGCG G UCCUGAUG	1174	CATCAGGA GGCTAGCTACAACGA GCCAGGGC	3549
348	GCCGCCAA G CUUCCUCU	1175	AGAGGGGG GGCTAGCTACAACGA TTGGGGG	3550
365	CCUGAGAA G CACCCAGC	1176	GCTGGTGG GGCTAGCTACAACGA CTCTCAGG	3551
372	AGCCACCA G CACACCCC	1177	GGGTGGTG GGCTAGCTACAACGA TGGTGGCT	3552
391	ACUUGGGG G CAGCGCCC	1178	GGCGCCTG GGCTAGCTACAACGA CCCCAGT	3553
395	GGGGCGAG G CGCAGGG	1179	CCCTGGGG GGCTAGCTACAACGA CTGCCCCC	3554
410	GGACGGAC G UGGCGCAG	1180	CTGGCCCA GGCTAGCTACAACGA GTCCGTC	3555
414	GGACGUGG G CAGGUGCG	1181	CGCACTGG GGCTAGCTACAACGA CCAGTCC	3556
418	GUGGGCCA G UGCGAGCC	1182	GGCTCGCA GGCTAGCTACAACGA TGGCCAC	3557
424	CAGUGCGA G CCCAGAGG	1183	CCTCTGGG GGCTAGCTACAACGA TCGACTG	3558
433	CCAGAGG G CCGAAGG	1184	CCTTCGGG GGCTAGCTACAACGA CTTCTGGG	3559
441	GCCCGAAG G CCGGGGCC	1185	GGCCCGGG GGCTAGCTACAACGA CTTCTGGG	3560

Table 22

447	AGGCCGGG	G	CCCAACAU	1186	ATGGTGGG	GGCTAGCTACAACGA	CCCGGCTT	3561
457	CCACCAUG	G	CCCAAGCC	1187	GGCTTGGG	GGCTAGCTACAACGA	CATGGTGG	3562
463	UGGCCCAA	G	CCUCGCC	1188	GGCGAGGG	GGCTAGCTACAACGA	TTGGGCCA	3563
474	CUGCCCUU	G	CUCUCGU	1189	AGCAGGAG	GGCTAGCTACAACGA	CAGGCGAG	3564
491	GUGGAUUG	G	CGCGGAG	1190	CTCCCGCG	GGCTAGCTACAACGA	CCATGCAC	3565
499	CGCGGGGA	G	UGUCBCU	1191	AGGCAGCA	GGCTAGCTACAACGA	TCGGCGCG	3566
515	UGCCACAG	G	CACCCAGC	1192	GCTGGGTG	GGCTAGCTACAACGA	CGTGGGCA	3567
522	GGCACCCA	G	CACGGCAU	1193	ATGCGGTG	GGCTAGCTACAACGA	TGGTGGCC	3568
527	CCAGCAGG	G	CAUCGCGC	1194	GCGCGATG	GGCTAGCTACAACGA	CGTGCTGG	3569
534	GGCAUCCG	G	CUGGCCCU	1195	AGGGGCGG	GGCTAGCTACAACGA	CGGATGCC	3570
548	CCUGCGGA	G	CGGCGUGG	1196	CCAGGCGG	GGCTAGCTACAACGA	TGCGCAGG	3571
551	CGCAGCGG	G	CCUGGGGG	1197	CCCCACAG	GGCTAGCTACAACGA	CCTGCGCG	3572
560	CCUGGGGG	G	CGCCCCCG	1198	GGGGGGGG	GGCTAGCTACAACGA	CCCCCAGG	3573
573	CCCCUGGG	G	CUGCGGCU	1199	AGCGCGAG	GGCTAGCTACAACGA	CCGAGGGG	3574
579	GGGCUUGG	G	CUGGCCCG	1200	CGGGGCGG	GGCTAGCTACAACGA	CGCAGCCC	3575
603	GACGAAGA	G	CCGAGAGA	1201	TCTCGGGG	GGCTAGCTACAACGA	TCTGCTGC	3576
612	CCCGAGGA	G	CCCGGCCG	1202	CGGCGGGG	GGCTAGCTACAACGA	TCTCTGGG	3577
617	GGAGCCCC	G	CCGGAAGG	1203	CCCTCCGG	GGCTAGCTACAACGA	CGGGCTCC	3578
626	CCGGAAGG	G	CAGGCUUG	1204	CAAAAGCT	GGCTAGCTACAACGA	CCCTCCGG	3579
629	GAGGGGCA	G	CUUUGUGG	1205	CCACAAAG	GGCTAGCTACAACGA	TGCCCTCT	3580
643	UGGGAUUG	G	GAGCAAC	1206	GTTGTCCA	GGCTAGCTACAACGA	CATCTCCA	3581
659	CCUGAGGG	G	CAAGUCGG	1207	CCGACTTG	GGCTAGCTACAACGA	CCCTCAGG	3582
663	AGGGGCAA	G	UCGAGGCA	1208	TGCCCCGA	GGCTAGCTACAACGA	TTGCCCTT	3583
669	AAGUCUUG	G	CAGGCUUA	1209	TAGCCCTG	GGCTAGCTACAACGA	CCGACTTT	3584
674	GGGCGAGG	G	CUCACUAG	1210	CGTAGTAG	GGCTAGCTACAACGA	CCTGCCCC	3585
682	GCUACUAC	G	CGAGUAUG	1211	CATCTCCA	GGCTAGCTACAACGA	GTAGTAGC	3586
684	AGAUGACC	G	UGGCGACG	1212	GCTGCCCA	GGCTAGCTACAACGA	GCTATCTT	3587
698	GACCGUGG	G	CAGCCCCC	1213	GGGGGGCT	GGCTAGCTACAACGA	CAGGCTTC	3588
701	CGUGGGGA	G	CCCCCGCG	1214	CGGGGGGG	GGCTAGCTACAACGA	TGCCCAGG	3589
727	ACAUCUUG	G	UGGAUACA	1215	TGTATCCA	GGCTAGCTACAACGA	CAGGATGT	3590
737	GGAUACAG	G	CAGCAUGA	1216	TACTGCTG	GGCTAGCTACAACGA	GCTATGCC	3591
740	UACAGGCA	G	CAGUAACU	1217	AGTTACTG	GGCTAGCTACAACGA	TGCTGTGA	3592
743	AGGCAGCA	G	UAACUUUG	1218	CAAAGTTA	GGCTAGCTACAACGA	TGCTGCCT	3593
754	ACUUUGCA	G	UGGGUGCU	1219	AGCACCCA	GGCTAGCTACAACGA	TGCAAAAGT	3594
758	UGCAGUGG	G	UGCUGCCC	1220	GGGCAGCA	GGCTAGCTACAACGA	CAACTGCA	3595
798	UACAGAGG	G	CAGCUGUC	1221	GACAGCTG	GGCTAGCTACAACGA	CTCTGGTA	3596
801	CAGAGGCA	G	CUGUCCAG	1222	CTGGACAG	GGCTAGCTACAACGA	TGCTCTGT	3597
809	GCUGUCCA	G	CACAUACC	1223	GGTATGTG	GGCTAGCTACAACGA	TGGACAGC	3598
833	CCGGAAGG	G	UGUGUAUG	1224	CATACACA	GGCTAGCTACAACGA	CTTCCGGG	3599
857	CACCCAGG	G	CAGUGGGG	1225	CCCACTGT	GGCTAGCTACAACGA	CCTGGGTT	3600
861	CAGGGCAA	G	UGGGAAGG	1226	CTTCTCCA	GGCTAGCTACAACGA	TTGCCCTG	3601
873	GAAGGGGA	G	CUGGGCAC	1227	GTGCCGAG	GGCTAGCTACAACGA	TCCCTCTT	3602
878	GGAGCUGG	G	CACGACCC	1228	GGTCGGTG	GGCTAGCTACAACGA	CCAGCTCC	3603
889	CCGACCUU	G	UGAGCAUC	1229	GATGCTTA	GGCTAGCTACAACGA	CAGGCTCG	3604
893	CCUGGUAA	G	CAUCCCCC	1230	GGGGGATG	GGCTAGCTACAACGA	TTACAGGG	3605
905	CCCCCAUG	G	CCCAACGG	1231	CGTTGGGG	GGCTAGCTACAACGA	CATGGGGG	3606
913	GGCCCAAC	G	UCACUGUG	1232	CACAGTGA	GGCTAGCTACAACGA	GTTGGGGG	3607
923	CACUGUGC	G	UGGCAACA	1233	TGTTGGCA	GGCTAGCTACAACGA	GCACAGTG	3608
957	UCAGACAA	G	UUUUUACU	1234	ATGAAGAA	GGCTAGCTACAACGA	TGTTCTGA	3609
971	CAUACACG	G	CUUCCACU	1235	AGTTGGAG	GGCTAGCTACAACGA	CGTTGATG	3610
986	CUGGAAGG	G	CAUCCUGG	1236	CCAGGATG	GGCTAGCTACAACGA	CTTCCAGG	3611

Table 22

996	AUCCUGG G	CUGGCCUA	1237	TAGGCCAG	GGCTAGCTACAACGA	CCAGGAT	3612
1000	UGGGGUG G	CCUAGUCU	1238	AGCATAGG	GGCTAGCTACAACGA	CAGCCCCA	3613
1020	AUUGCCAG G	CCUGACGA	1239	TCGTCAGG	GGCTAGCTACAACGA	CTGGCAAT	3614
1038	UCCCUUGA G	CCUUUCUU	1240	AAGAAGG	GGCTAGCTACAACGA	TCCAGGGA	3615
1057	ACUCUCUG G	UAAAGCAG	1241	CTGCTTTA	GGCTAGCTACAACGA	CAGAGAGT	3616
1062	CUGGUAAG G	CAGACCCA	1242	TGGSTCTG	GGCTAGCTACAACGA	TTTACCAG	3617
1072	AGACCCAC G	UUCCCAAC	1243	GTTGGGAA	GGCTAGCTACAACGA	GTGGGTCT	3618
1095	UCCUCGCA G	CUUUGUGG	1244	CCACAAAG	GGCTAGCTACAACGA	TGCAGGGA	3619
1103	GUUUUGUG G	UGUGGUCU	1245	AGCCAGCA	GGCTAGCTACAACGA	CCAAAGC	3620
1109	UGUGUGUG G	CUUCCCCC	1246	GGGGGAAG	GGCTAGCTACAACGA	CAGCACCA	3621
1125	CUCAGCA G	UCUAGAUG	1247	ACTTCAGA	GGCTAGCTACAACGA	TGTTGAG	3622
1132	AGUCUGAA G	UGUGGCC	1248	GGCCAGCA	GGCTAGCTACAACGA	TTGAGACT	3623
1138	AAGUGCUG G	CCUCUGUC	1249	GACAGAGG	GGCTAGCTACAACGA	CAGCACTT	3624
1154	CGAGGGA G	CAUGAUA	1250	TGATCATG	GGCTAGCTACAACGA	TCCCTCG	3625
1169	CAUUGGAG G	UAUGACC	1251	GGTCGATA	GGCTAGCTACAACGA	CTCCAACT	3626
1193	GUCACAG G	CUAGUCU	1252	AGAGACTG	GGCTAGCTACAACGA	CTGTGTAC	3627
1196	CACAGGCA G	UCUCUGGU	1253	ACCAGAGA	GGCTAGCTACAACGA	TGCTGTG	3628
1203	AGUCUCUG G	UAUACACC	1254	GGTGTATA	GGCTAGCTACAACGA	CAGAGACT	3629
1218	CCUACCG G	CGGAGUG	1255	CACTCCCG	GGCTAGCTACAACGA	CGATGGG	3630
1224	CGGCGGGA G	UGGUUAU	1256	TAATACCA	GGCTAGCTACAACGA	TCCGCGG	3631
1227	CGGAGUG G	UAUUAUGA	1257	TCATAATA	GGCTAGCTACAACGA	CACTCCAG	3632
1237	AUUAUGAG G	UGAUCAU	1258	AATGATCA	GGCTAGCTACAACGA	CTCATAAT	3633
1252	UUGUGCG G	UGGAGAUC	1259	GATCTCCA	GGCTAGCTACAACGA	CGCACAA	3634
1293	UGACAGGA G	CAUACAUA	1260	TAGTTGTA	GGCTAGCTACAACGA	TCCTTCCA	3635
1310	UGACAGGA G	CAUUGUGG	1261	CCACAATG	GGCTAGCTACAACGA	TCTGTACA	3636
1322	UGUGGACA G	UGGCACCA	1262	TGTTGCCA	GGCTAGCTACAACGA	TGTCACA	3637
1325	GGACAGUG G	CACCACCA	1263	TGGTGGTG	GGCTAGCTACAACGA	CACTGTCC	3638
1340	CAACCUUC G	UUUGCCCA	1264	TGGGCAAA	GGCTAGCTACAACGA	GANGTTG	3639
1354	CCAAGAAA G	UGUUGAA	1265	TTCAAACA	GGCTAGCTACAACGA	TTTCTGG	3640
1363	UGUUGGAA G	CUGCAGUG	1266	GAGTCAG	GGCTAGCTACAACGA	TTCAAACA	3641
1369	AAGCUGCA G	UCAAUUC	1267	GGATTGTA	GGCTAGCTACAACGA	TGAGCTT	3642
1384	CCAUCAG G	CAGCCUCC	1268	GGAGGCTG	GGCTAGCTACAACGA	CTTGATGG	3643
1387	UCAAGGCA G	CCUCUCC	1269	GGAGGAGG	GGCTAGCTACAACGA	TGCTTTGA	3644
1404	ACGGAGAA G	UUCCUGA	1270	TCAGGCAA	GGCTAGCTACAACGA	TCTCCGT	3645
1415	CCCUUGAG G	UUUCUGG	1271	GCCAGAAA	GGCTAGCTACAACGA	CATCAGGG	3646
1422	GGUUCUG G	CUAGGAGA	1272	TCTCCTAG	GGCTAGCTACAACGA	CAGAAAC	3647
1431	CUAGGAGA G	CAGCUGGU	1273	ACCAGCTG	GGCTAGCTACAACGA	TCTCCTAG	3648
1434	GGAGAGCA G	CUGGUGU	1274	CACACCAG	GGCTAGCTACAACGA	TGCTCTCC	3649
1438	AGCAGCUG G	UGUGUGG	1275	CCAGCACA	GGCTAGCTACAACGA	CAGCTGCT	3650
1446	GGUGUGUG G	CAAGCAGG	1276	CCTGCTTG	GGCTAGCTACAACGA	CAGCACAC	3651
1450	GCUGGCAA G	CAGGCACC	1277	GGTGCTTG	GGCTAGCTACAACGA	TGGCAGC	3652
1454	GCAAGCAG G	CACCACCC	1278	GGGTGGTG	GGCTAGCTACAACGA	CTGCTTGC	3653
1480	UUUUCUCA G	UCAUCUA	1279	TGAGATGA	GGCTAGCTACAACGA	TGGGAAAA	3654
1502	CCUAAUGG G	UGUGUUA	1280	TAACTTCA	GGCTAGCTACAACGA	CAATTAGG	3655
1507	UGGUGAG G	UUACCAAC	1281	GTTGTTAA	GGCTAGCTACAACGA	CTCACCAC	3656
1518	ACCAACCA G	UCCUCCG	1282	CGGAGGA	GGCTAGCTACAACGA	TGGTTGT	3657
1545	CUUCCGCA G	CAUACCU	1283	AGGTATTG	GGCTAGCTACAACGA	TGCGGAAG	3658
1557	UACUCUGG G	CCAGUGGA	1284	TCACTGAG	GGCTAGCTACAACGA	CGCAGGTA	3659
1561	UGCGGCCA G	UGAGGAU	1285	ATCTTCCA	GGCTAGCTACAACGA	TGGCCGCA	3660
1573	AAGAUGUG G	CCACGUCC	1286	GGAGTGGG	GGCTAGCTACAACGA	CACATCTT	3661
1578	GUGGCCAC G	UCCCAAGA	1287	TCTTGGGA	GGCTAGCTACAACGA	GTGGCCAC	3662

Table 22

1599	UGUUAACA	G	UUGCCA	1288	ATGGCAAA	GGCTAGCTACAACGA	TTGTAACA	3663
1614	AUCUCACA	G	UCAUCCAC	1289	GTGGATGA	GGCTAGCTACAACGA	TGTGAGAT	3664
1625	AUCCACGG	G	CACUUAUA	1290	TAACAGTG	GGCTAGCTACAACGA	CCGTGAT	3665
1639	UUAUGGGA	G	CUGUIAUC	1291	GATAACAG	GGCTAGCTACAACGA	TCCATGAA	3666
1655	CAUGGAGG	G	CUUCUACG	1292	CGTAGAAG	GGCTAGCTACAACGA	CCTCATGT	3667
1663	GCUCUAC	G	UUGUCU	1293	AAAGACAA	GGCTAGCTACAACGA	GTAGAAGC	3668
1678	UUGAUCGG	G	CCCGAAAA	1294	TTTTCGGG	GGCTAGCTACAACGA	CCGATCAA	3669
1694	ACGAAUUG	G	CUUUGCUG	1295	CAGCAAA	GGCTAGCTACAACGA	CAATTCGT	3670
1706	UGUGUGUA	G	CGCUGGCC	1296	GGCAAGCG	GGCTAGCTACAACGA	TGCACAGA	3671
1728	CACGAUGA	G	UUCAGGAC	1297	GTCTGTAA	GGCTAGCTACAACGA	TCATCGTG	3672
1738	UCAGGACG	G	CAGCGUG	1298	CACCGCTG	GGCTAGCTACAACGA	CGTCTGTA	3673
1741	GGACGGCA	G	CGGUGGAA	1299	TTCCACCG	GGCTAGCTACAACGA	TGCGGTCC	3674
1744	CGCAGCG	G	UGGAAAGC	1300	GCCTTCCA	GGCTAGCTACAACGA	CGCTGCGG	3675
1751	GUGUGAAG	G	CCCUUUG	1301	CAAAAGGG	GGCTAGCTACAACGA	TCTCCACC	3676
1784	AGACUGUG	G	CUACAACA	1302	TGTTGTAG	GGCTAGCTACAACGA	CACAGTCT	3677
1809	ACAGAUGA	G	UCAACCCU	1303	AGGTTTGA	GGCTAGCTACAACGA	TCATCTGT	3678
1828	UGACCAUA	G	CCUUAUUC	1304	GACATAGG	GGCTAGCTACAACGA	TATGGTCA	3679
1840	AUGUCAUG	G	CUGCCAUC	1305	GATGUCAG	GGCTAGCTACAACGA	CATGACAT	3680
1882	GCUCAUUG	G	UGUUGCAG	1306	CTGACACA	GGCTAGCTACAACGA	CATGAGGC	3681
1890	GUGUGUA	G	UGGCGCUG	1307	CAGCGCCA	GGCTAGCTACAACGA	TGACACAC	3682
1893	UGUCAGUG	G	CGCUGCCU	1308	AGGCAGCG	GGCTAGCTACAACGA	CACGTGAC	3683
1917	CUGCGCCA	G	CAGCAUGA	1309	TCATGCTG	GGCTAGCTACAACGA	TGGCGCAG	3684
1920	CGCCAGCA	G	CAUGAUGA	1310	TCAATCAT	GGCTAGCTACAACGA	TGCTGGCG	3685
1956	CUGUGAAG	G	UGAGGAGG	1311	CCTCTCCA	GGCTAGCTACAACGA	TTCAGCAG	3686
1964	GUGAGGAG	G	CCCAUUGG	1312	CCATGCGG	GGCTAGCTACAACGA	CTCTCTAC	3687
1972	GCCCAUGG	G	CAGAAGAU	1313	ATCTTCTG	GGCTAGCTACAACGA	CCATGGCG	3688
2006	ACACCUCC	G	UGGUUAC	1314	GTGAACCA	GGCTAGCTACAACGA	GGAGGTGT	3689
2009	CCUCGUGG	G	UUCACUUU	1315	AAAGTGAA	GGCTAGCTACAACGA	CACGGAAG	3690
2019	UCACUUXG	G	UCACAAGU	1316	ACTTGTGA	GGCTAGCTACAACGA	CAAGTGGA	3691
2026	GGUCACAA	G	UAGGAGAC	1317	GTCTCCTA	GGCTAGCTACAACGA	TTGTGACC	3692
2042	CACAGAUG	G	CACCUUGG	1318	CACAGGTG	GGCTAGCTACAACGA	CATCTGTG	3693
2051	CACCUUGG	G	CCAGAGCA	1319	TGCTCTGG	GGCTAGCTACAACGA	CACAGGTG	3694
2057	UGGCCAGA	G	CACCUACG	1320	CTGAGGTG	GGCTAGCTACAACGA	TCTGGCCA	3695
2114	AGGAAAGG	G	CUGGCAAG	1321	CTTGCCAG	GGCTAGCTACAACGA	CTTTCTCT	3696
2118	AAAGGCUG	G	CAGGUGUG	1322	CCACCTTG	GGCTAGCTACAACGA	CAGCCTTT	3697
2123	CUGGCAAG	G	UGGUUUC	1323	GGAAACCA	GGCTAGCTACAACGA	CTTCCGAG	3698
2127	CAGGUGUG	G	UUCGAGGG	1324	CCCTGGAA	GGCTAGCTACAACGA	CCACCTTG	3699
2172	AGAAAGAA	G	CACUCUGC	1325	GCAGAGTG	GGCTAGCTACAACGA	TTCTTTCT	3700
2183	CUUCUGUG	G	CGGGAUA	1326	TATTTCCG	GGCTAGCTACAACGA	CAGCAGAG	3701
2198	UACUCUUG	G	UCACCUCA	1327	TGAGGTGA	GGCTAGCTACAACGA	CAGAGTGA	3702
2214	AAAUUUA	G	UCGGGAAA	1328	TTTCCCGA	GGCTAGCTACAACGA	TTAAATTT	3703
2243	AAACUUA	G	CCUUGAAC	1329	GTTCAGGG	GGCTAGCTACAACGA	CTGGGTGT	3704
2288	AAUCCAAA	G	UAUUCUUC	1330	GAAGAATA	GGCTAGCTACAACGA	TTTGGGTT	3705
2305	UUUUCUUA	G	UUAACGAA	1331	TTCTGAAA	GGCTAGCTACAACGA	TAGAAAAA	3706
2314	UUUCAGAA	G	UACUGGCA	1332	TGCGAGTA	GGCTAGCTACAACGA	TTCTGAAA	3707
2320	AAGUACUG	G	CAUCACAC	1333	GTGTGATG	GGCTAGCTACAACGA	CAGTACTT	3708
2333	ACACGCAG	G	UUUACUUG	1334	CAAGGTAA	GGCTAGCTACAACGA	CTGGGTGT	3709
2342	UUAUCCUUG	G	CGUGUGUG	1335	GACACACG	GGCTAGCTACAACGA	CAAGGTAA	3710
2344	ACCUUGGC	G	UGUGUCCC	1336	GGGACACA	GGCTAGCTACAACGA	GCCAAAGT	3711
2357	UCCUUGUG	G	UACCCUGG	1337	CCAGGATA	GGCTAGCTACAACGA	CACAGGGA	3712
2365	GUACCCUG	G	CAGAGGAG	1338	CTTCTCTG	GGCTAGCTACAACGA	CAGGGTAC	3713

Table 22

2381	GAGACCAA	G	CUUGUUUC	1339	GAACAACG	GGCTAGCTACAACGA	TTGGTCTC	3714
2397	CCCUGCUG	G	CCAAGUC	1340	GACTTTGG	GGCTAGCTACAACGA	CAGCAGGG	3715
2403	UGGCGCAA	G	UCAGUAGG	1341	CCTACTGA	GGCTAGCTACAACGA	TTTGCCCA	3716
2407	CAAGGUCA	G	UAGGAGAG	1342	CTCTCTTA	GGCTAGCTACAACGA	TGACTTTG	3717
2424	GAUGGACA	G	UUUGCUAU	1343	ATAGCAAA	GGCTAGCTACAACGA	TGTGCATC	3718
2463	AUAAACAA	G	CUUAACAU	1344	ATGTTAGG	GGCTAGCTACAACGA	TTGTTTAT	3719
2474	UAACAUGG	G	UGCAAGA	1345	TCTTTGCA	GGCTAGCTACAACGA	CAATGTTA	3720
45	CGAGCUGG	A	UUAUGGUG	1346	CACCATAA	GGCTAGCTACAACGA	CCAGCTCG	3721
67	AGCAGCCA	A	CGCAGCGG	1347	CGCTGCGG	GGCTAGCTACAACGA	CGCTGCTC	3722
125	CCGGGGGG	A	CCAGGGAA	1348	TTCCCTGG	GGCTAGCTACAACGA	CCCCCGG	3723
217	CCUGCCCG	A	UGUACGGG	1349	CGCTTACA	GGCTAGCTACAACGA	CGCAGCGG	3724
233	GGCUCGGG	A	UCCAGCGC	1350	GGCTGGGA	GGCTAGCTACAACGA	CCGGAGCC	3725
267	CUCUGCGG	A	UCUCCCUU	1351	AGGGGAGA	GGCTAGCTACAACGA	CCGACAGG	3726
277	CUCCCUGG	A	CCGCUUCU	1352	GAGAGCGG	GGCTAGCTACAACGA	CAGGGGAG	3727
296	CAGCCCGG	A	CCCGGGGG	1353	CCCCCGGG	GGCTAGCTACAACGA	CCGGGCTG	3728
338	GGCUCUGG	A	UGCCCCCA	1354	TGGGGGCA	GGCTAGCTACAACGA	CAGGAGCG	3729
383	CCACCCAG	A	CUUGGGGG	1355	CCCCCAAG	GGCTAGCTACAACGA	CTGGGTGG	3730
404	CGCCAGGG	A	CGGAGGUG	1356	CAGCTCGG	GGCTAGCTACAACGA	CCCTGGCG	3731
408	AGGAGCGG	A	CGGCGGCC	1357	GGCCCAAG	GGCTAGCTACAACGA	CCGTCCTC	3732
487	UGCUGUGG	A	UGGGCGCG	1358	CGCGCCCA	GGCTAGCTACAACGA	CCACAGCA	3733
592	CCCGGGAG	A	CCGACGAA	1359	TTGCTCGG	GGCTAGCTACAACGA	CCCGGGGG	3734
596	GGAGACCG	A	CGAAGAGC	1360	GCTCTTCG	GGCTAGCTACAACGA	CGGTCTCC	3735
640	UUUGUGAG	A	UGGUGGAC	1361	GTCCACCA	GGCTAGCTACAACGA	CTCCACAA	3736
747	GAUGGUGG	A	CAACUGA	1362	TCAGGTTG	GGCTAGCTACAACGA	CAACGATC	3737
650	GGUGGACA	A	CCUGAGGG	1363	CCCTCAGG	GGCTAGCTACAACGA	TGTCACCC	3738
688	ACGUGGAG	A	UGACCGUG	1364	CACGGTCA	GGCTAGCTACAACGA	CTCCACGT	3739
691	UGGAGAUG	A	CCGUGGGC	1365	GCCCCAGG	GGCTAGCTACAACGA	CATCTCCA	3740
712	CCCCCGAG	A	CGCUAAC	1366	GTGAGCGG	GGCTAGCTACAACGA	CTGGGGGG	3741
719	GACGCUCA	A	CAUCUGGG	1367	CCAGGATG	GGCTAGCTACAACGA	TGAGCTTC	3742
731	CCUGGUGG	A	UACAGGCA	1368	TGCTTGTA	GGCTAGCTACAACGA	CCACGAGG	3743
746	CAGCAGUA	A	CUUUGCAG	1369	CTGCAAGG	GGCTAGCTACAACGA	CTACTCTG	3744
821	AUACCCGG	A	CCUCGGA	1370	TCCGGAGG	GGCTAGCTACAACGA	CCCCGTAT	3745
884	GGGACCCG	A	CCUGGUAA	1371	TTACCAAG	GGCTAGCTACAACGA	CGGTGCCC	3746
911	UGGCCCCA	A	CGUCACUG	1372	CAGTGACG	GGCTAGCTACAACGA	TGGGGCCA	3747
929	GGGUGCCA	A	CAUUGCUG	1373	CAGCAATG	GGCTAGCTACAACGA	TGGACAGC	3748
948	AUCACUGA	A	UCAGACAA	1374	TTGTTGGA	GGCTAGCTACAACGA	TCAGTGAT	3749
953	UGAAUACG	A	CAAGUUCU	1375	AGAAGTTG	GGCTAGCTACAACGA	CTGATTCA	3750
968	CUUCAUCA	A	CGGUCUCA	1376	TGGAGCGG	GGCTAGCTACAACGA	TGATGAAG	3751
977	CGGCUCCA	A	CGGGGAAG	1377	CTTCCGAG	GGCTAGCTACAACGA	TGAGGCGG	3752
1012	AUGCUGAG	A	UUGCCAGG	1378	CTTGGCAA	GGCTAGCTACAACGA	CTCAGCAT	3753
1025	CAGGCCUG	A	CGACUCCC	1379	GGGAGTCG	GGCTAGCTACAACGA	CAGGCCGT	3754
1028	GCUGAGCG	A	CUCCUGGG	1380	CCAGGGAG	GGCTAGCTACAACGA	CGTCAGGC	3755
1049	UUUCUUUG	A	CUUCUUGG	1381	CCAGAGAG	GGCTAGCTACAACGA	CAAAGAAA	3756
1066	UAAAGCAG	A	CCACGUAU	1382	AACGTGGG	GGCTAGCTACAACGA	CTCCTTTA	3757
1079	CGUUCCCA	A	CCUCUUCU	1383	AGAAGAGG	GGCTAGCTACAACGA	TGGGAACG	3758
1121	CCCCCUCA	A	CCAGUCUG	1384	CAGACTGG	GGCTAGCTACAACGA	TGAGGGGG	3759
1159	GGAGCAUG	A	UCAUUGGA	1385	TCCAATGA	GGCTAGCTACAACGA	CATGCTCC	3760
1175	AGGUAUUG	A	CCACUCGC	1386	GCGAGTGG	GGCTAGCTACAACGA	CGATACCT	3761
1240	AUGAGGUG	A	UCAUUGUG	1387	CACAATGA	GGCTAGCTACAACGA	CACCTCAT	3762
1258	GGGUGGAG	A	UCAUUGGA	1388	TCCATTGA	GGCTAGCTACAACGA	CTCCACCC	3763
1262	GGAGAUCA	A	UGACAGGG	1389	CCTGTCCA	GGCTAGCTACAACGA	TGATCTCC	3764

Table 22

1266	AUCAAUGG A CAGGAUCU	1390	AGATCTGT GGCTAGCTACAACGA CCATTGAT	3765
1271	UGGACAGG A UCUGAAAA	1391	TTTTCAGA GGCTAGCTACAACGA CCTGTCCA	3766
1279	AUCUGAAA A UGGACUGC	1392	GCAGTCCA GGCTAGCTACAACGA TTTGAGAT	3767
1283	GAAAUGG A CUGCAAGG	1393	CCTTGCGA GGCTAGCTACAACGA CCAITTTTC	3768
1298	GGAGUACA A CUAUGACA	1394	TGTCATAG GGCTAGCTACAACGA GTGATCCC	3769
1304	CAACUAUG A CAAGAGCA	1395	TGCTCTTG GGCTAGCTACAACGA CATAGTTG	3770
1319	CAUUGUGG A CAGUGGCA	1396	TGCCACTG GGCTAGCTACAACGA CCACAAATG	3771
1334	CACCACCA A CCUUCGUT	1397	AACGAAGG GGCTAGCTACAACGA TGGTGGTG	3772
1374	GCAGUCAA A UCCAUCAA	1398	TGTATGGA GGCTAGCTACAACGA TTGACTGC	3773
1412	GUUCCUG A UGUUUUCU	1399	AGAAACCA GGCTAGCTACAACGA CAGGGAAC	3774
1469	CCUUGGAA A CAUUUUC	1400	GGAAAAATG GGCTAGCTACAACGA TCCAAGGG	3775
1498	UCUACUAA A UGGUGAG	1401	CTCACCCA GGCTAGCTACAACGA TAGGTAGA	3776
1514	GGUUAACA A CCAUGUCU	1402	AGGACTGG GGCTAGCTACAACGA TGTAAACC	3777
1548	CCGCAGCA A UACUCGCG	1403	CGCAGGTA GGCTAGCTACAACGA TGTGCGG	3778
1568	AGUGGAAG A UUGUGCCA	1404	TGCGCACA GGCTAGCTACAACGA CTTCACAT	3779
1586	GUCCCAAG A GCACUGU	1405	AACAGTCG GGCTAGCTACAACGA CTGCGAC	3780
1589	CCAAGACG A CGGUUACA	1406	TGTAACAG GGCTAGCTACAACGA CGTCTTGG	3781
1673	UGUCUUUG A UCGGGCCC	1407	GGGCCCCG GGCTAGCTACAACGA CAAAGACA	3782
1686	GGCCGAAA A CCGAUUGG	1408	CCAAATTC GGCTAGCTACAACGA TTTGCGGC	3783
1690	GAAAACGA A UUGGCUUU	1409	AAAGCCAA GGCTAGCTACAACGA TCGTTTTC	3784
1724	UGUGCAAG A UGAGUUA	1410	TGAATCCA GGCTAGCTACAACGA CGTGACCA	3785
1735	AGUUCUAG A CGGACGG	1411	CGCTGCGG GGCTAGCTACAACGA CCTGAATC	3786
1769	CAUCUUGG A CAGGAAG	1412	CTTCCATG GGCTAGCTACAACGA CCAAGGTG	3787
1778	CAUGGAAG A CAUGGUCU	1413	AGCCACAG GGCTAGCTACAACGA CTTCATG	3788
1790	UGGCUACA A CAUCCAC	1414	GTGGAATG GGCTAGCTACAACGA TGTAGCCA	3789
1801	UUCACAG A CAGAUGAG	1415	CTCATCTG GGCTAGCTACAACGA CTGTGAA	3790
1805	ACAGACAG A UGAGUCA	1416	TTGACTCA GGCTAGCTACAACGA CTGTCTGT	3791
1813	AUGAGUCA A CCCCUG	1417	CATGAGGG GGCTAGCTACAACGA TGACTCAT	3792
1822	CCCUCAUG A UAGAGGCC	1418	GGCTATGG GGCTAGCTACAACGA CATGAGGG	3793
1925	GCAGCAUG A UGACUUG	1419	CAAGTCCA GGCTAGCTACAACGA CATGTGCG	3795
1928	GCAUGAUG A CUUUGUG	1420	CAGCAAAG GGCTAGCTACAACGA CAGCAAAG	3796
1937	CUUUGCUG A UGAGUACU	1421	AGATGTCA GGCTAGCTACAACGA CATCAGCA	3797
1940	UGCUGAUG A CAUCUCCC	1422	GGGAGATG GGCTAGCTACAACGA CATCTGCC	3798
1979	GGCAGAAG A UAGAGAUU	1423	AATCTCTA GGCTAGCTACAACGA CTCTATCT	3799
1985	AGAUAGAG A UUCUCCUG	1424	CAGGUGAA GGCTAGCTACAACGA CAGGGGGA	3800
1995	UCCUCCUG A CCACACCU	1425	AGGTGTGG GGCTAGCTACAACGA CTCTACT	3801
2033	AGUAGGAG A CACAGAU	1426	CATCTGTG GGCTAGCTACAACGA CTCTACT	3802
2039	AGACACAG A UGGACACU	1427	AGGTGCCA GGCTAGCTACAACGA CTGTGTCT	3803
2067	ACCUCAAG A CCUCUCCC	1428	GGGGAGGG GGCTAGCTACAACGA CCGAGGTT	3804
2085	CCACACAA A UGCCUCUG	1429	CAGAGGCA GGCTAGCTACAACGA TTGTTGGG	3805
2099	CUGCCUUG A UUGAGAAG	1430	CTTCTCCA GGCTAGCTACAACGA CCCTGGAA	3806
2136	UUCACAGG A CAGAAACU	1431	AGGTACAG GGCTAGCTACAACGA CCAAGGAA	3807
2152	UGUAGGAA A CAGAAAG	1432	CTTTTCTG GGCTAGCTACAACGA TTCCATCA	3808
2189	UGGCGGGA A UACUCUG	1433	CAGAGTA GGCTAGCTACAACGA TCCCGGAC	3809
2208	CACCUCAA A UUIAAGUC	1434	GACTTAAA GGCTAGCTACAACGA TTGAGGTG	3810
2222	GUCGGGAA A UUCUGCUG	1435	CAGCAGAA GGCTAGCTACAACGA TTCAAGCA	3811
2237	UGUCUGAA A CUUACGCC	1436	GGCTGAAG GGCTAGCTACAACGA TCAAGGCT	3812
2250	AGCCUGA A CCUUUGUC	1437	GACAAAGG GGCTAGCTACAACGA TTAAGGCA	3813
2273	UCCUUUAA A UUCUCCAA	1438	TTGAGAA GGCTAGCTACAACGA TGAAGAT	3814
2281	AUUCUCCA A CCCAAAGU	1439	ACTTTGGG GGCTAGCTACAACGA CTCTCTCT	3815
2376	GAGAAGAG A CCAAGCUU	1440	AAGTCTGG GGCTAGCTACAACGA CTCTCTCT	3815

Table 22

2417	AGGAGAGG A UGCACAGU	1441	ACTGTGCA GGCTAGCTACAACGA CCTCTCCT	3816
2444	CUUUAGAG A CAGGGACU	1442	AGTCCCTG GGCTAGCTACAACGA CTCTAAAG	3817
2450	AGACAGGG A CUGUAUAA	1443	TTATACAG GGCTAGCTACAACGA CCCTGTCT	3818
2459	CUGUAUAA A CAAGCCUA	1444	TAGGCTTG GGCTAGCTACAACGA TTATACAG	3819
2468	CAAGCCUA A CAUUGGUG	1445	CACCAATG GGCTAGCTACAACGA TAGGCTTG	3820
2482	GUGCAAAG A UUGCCUCU	1446	AGAGGCAA GGCTAGCTACAACGA CTTTGCAC	3821
2494	CCUCUUGA A UUAUAAAA	1447	TTTTTTAA GGCTAGCTACAACGA TCAAGAGG	3822
2507	AAAAAAA A CUAGAAAA	1448	TTTICTAG GGCTAGCTACAACGA TTTTTTTT	3823

Input Sequence = AF190725. Cut Site = G/.

Stem Length = 8. Core Sequence = GGCTAGCTACAACGA

AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 23

Table 23: Human BACE Amberzyme Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Re Seq ID
11	AGCGUCC G CAGCCGCG	960	GGGCGUG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3260
18	CGAGGCC G CCGGCGAG	961	CUCCCGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3261
29	CGAGGCU G CGAGCCGC	962	GCUCUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG AGUCUCC	3262
31	GGAGUCC G AGCGCGA	963	UCGCGGU GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3263
36	UCGAGCC G CGAGUGAU	964	CUAGCGU GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3264
38	CGAGCCG G AGCGUGAU	965	AUCCAGU GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3265
58	GGAGGCU G AGCAGCA	966	UCCGCUU GAGGAAAUCC CU UCAAGGACAUCCUCCGG AGUCUCC	3266
69	CAGCGAC G CAGCGCA	967	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3267
75	AGCGGCC G CAGAGCC	968	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3268
94	GAGGCCU G CCGCUGC	969	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3269
100	UUGCCCU G CCGCGCC	970	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG AGUCUCC	3270
104	CCUGGCC G CCGCGCC	971	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3271
106	CUGCCGC G CCGCGCC	972	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3272
109	CCGCGCC G CCGCGCC	973	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3273
112	GGCGGCC G CCGCGCC	974	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3274
116	GGCGGCC G CCGCGCC	975	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3275
137	GGAGGCC G CCGCGCC	976	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3276
148	ACCGGCC G CCGCGCC	977	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3277
153	CCGCGCC G CCGCGCC	978	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3278
157	CCGCGCC G CCGCGCC	979	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3279
172	CGAGGCC G CCGGAGC	980	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3280
183	CGAGGCC G CCGGAGC	981	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3281
185	GAGCGCC G CCGGAGC	982	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3282
189	CGAGGCC G CCGGAGC	983	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3283
192	CGAGGCC G CCGGAGC	984	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3284
205	GGCGGCC G CCGGAGC	985	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3285
208	UGCGGCC G CCGGAGC	986	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3286
213	GGCGGCC G CCGGAGC	987	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3287
216	GGCGGCC G CCGGAGC	988	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3288
250	UCUCCCU G CCGGAGC	989	GGCGUGG GAGGAAAUCC CU UCAAGGACAUCCUCCGG GAGCGUG	3289

Table 23

258	GCCTCCG G CUCGCGG	990	CCGACAG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCGAGC	3290
263	CUUGUCU G CGAATCUC	991	GAGUCCG GAGGAAATCC CU UCAAGGACAUCCGCGG AGAGACG	3291
276	UCUCCCCU G ACCGCTUC	992	AGAGCGU GAGGAAATCC CU UCAAGGACAUCCGCGG AGGAGAG	3292
280	CCCTGACC G CUCGTCAC	993	GUGGAG GAGGAAATCC CU UCAAGGACAUCCGCGG GATGAGG	3293
320	AGGCCCCU G CAGACCCU	994	AGGCTCG GAGGAAATCC CU UCAAGGACAUCCGCGG AGGCGCCU	3294
337	GAGGTCU G AUGCCGCC	995	GAGGCGU GAGGAAATCC CU UCAAGGACAUCCGCGG AGAGAAC	3295
340	GUCGAGU G CCGCCAG	996	CUUAGGAG GAGGAAATCC CU UCAAGGACAUCCGCGG AGAGAGG	3297
360	CCUCCUCU G AGAAGAC	997	UGGCUUC GAGGAAATCC CU UCAAGGACAUCCGCGG AGCUUCC	3298
397	GCGCAGC G CCNAGGAC	998	GUCUCCG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCUUCC	3299
420	GAGCCAGU G CGAGCCCA	999	UGGCGUC GAGGAAATCC CU UCAAGGACAUCCGCGG GACUCGCG	3300
422	GCAATUC G AGCAGAA	1000	CCGCGCU GAGGAAATCC CU UCAAGGACAUCCGCGG GAGCCUC	3301
437	GAGGCCC G AAGCGCG	1001	AGCAGG GAGGAAATCC CU UCAAGGACAUCCGCGG AGGCGUUG	3302
468	CAAGCCU G CCGUGCU	1002	AUCCAC GAGGAAATCC CU UCAAGGACAUCCGCGG AGAGACA	3303
480	UGGUCUCU G CUGUGAU	1003	CACUCCG GAGGAAATCC CU UCAAGGACAUCCGCGG GCGUCCG	3304
493	GAGGAGC G CGGAGUG	1004	GCAGCG GAGGAAATCC CU UCAAGGACAUCCGCGG ACUCCGCG	3305
501	GCGGAGU G CUGCUCG	1005	UGGCGAG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCAGCG	3306
504	GAGGAGU G CCGAGCA	1006	GCCTGAG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCAGCA	3307
508	UGUUGCU G CCGAGGC	1007	CCGAGG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCGAGU	3308
517	AUCGAGU G CCGCUGG	1008	CGCAGG GAGGAAATCC CU UCAAGGACAUCCGCGG AGGCGAG	3309
543	CCUCCCU G CGGAGCG	1009	GCGGUG GAGGAAATCC CU UCAAGGACAUCCGCGG GCGAGCG	3310
545	GCCTCUC G CAGCGCC	1010	CAGGAG GAGGAAATCC CU UCAAGGACAUCCGCGG GCCTCCA	3311
562	UGGAGGC G CCGCCUG	1011	GCGAGG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCCCGAG	3312
576	CUAGGCU G GCGUGGC	1012	UCCGCG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCCGAG	3313
582	CUGGAGU G CCGCGGA	1013	CUCUCU GAGGAAATCC CU UCAAGGACAUCCGCGG GCGUCCG	3314
595	GAGGACC G ACGAGCC	1014	GCGUCU GAGGAAATCC CU UCAAGGACAUCCGCGG GCGGUCU	3315
598	AGAAGGAC G AAGAGCC	1015	GAGGCUU GAGGAAATCC CU UCAAGGACAUCCGCGG GAGGUCU	3316
607	AAGAGCC G AGGAGCA	1016	GAGGCUU GAGGAAATCC CU UCAAGGACAUCCGCGG AGGUCUC	3317
654	GAGACU G AGGAGCA	1017	UUGCCCU GAGGAAATCC CU UCAAGGACAUCCGCGG AUCUCCAC	3318
690	GUGAGAU G ACCGUGG	1018	CCGAGU GAGGAAATCC CU UCAAGGACAUCCGCGG GAGGAGU	3319
708	AGCCCCC G CAGAGCG	1019	AGGUCU GAGGAAATCC CU UCAAGGACAUCCGCGG GUGGAGG	3320
714	CCGAGAC G CUCACAU	1020	ACCCAG GAGGAAATCC CU UCAAGGACAUCCGCGG AAGUCCG	3321
751	GUAAUUG G CAGUGAGU	1021	GAGGAG GAGGAAATCC CU UCAAGGACAUCCGCGG ACCGAGC	3322
760	CAGUGAGU G CUGCCCC	1022	GUGGAG GAGGAAATCC CU UCAAGGACAUCCGCGG AGCAGCA	3323
763	UGGUGUCU G CCGCCAC	1023		

Table 23

780	CCUUCU G CAUCGUA	1024	UAGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGAGGG	3324
785	CGGCAUC G CUCUAC	1025	GUUAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAUGCAG	3325
843	GUUUAUG G CCGUAC	1026	GUUUAUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACAUACG	3326
883	UGGCGAC G ACUGGUA	1027	UUCACAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUUCCGA	3327
921	GUACAGU G CGUCCAA	1028	UUGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUGAGC	3328
925	CUUUGGU G CCAACAU	1029	AUUUGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCCACG	3329
934	CCACAUU G CUGCAUC	1030	GAUGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAUUGUG	3330
937	CAUUGCU G CCGACUC	1031	AGUAUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCAUUG	3331
946	CAUACU G CAUCAGC	1032	GUUGAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUAGUG	3332
1006	UGGCUAU G CUGAGAU	1033	AAUUCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUAGGCCA	3333
1009	CGUAGU G AGAUAGC	1034	GGCAUUC GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCAUAG	3334
1015	CUAGAUU G CCGAGCCU	1035	AGGCUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGCCUG	3335
1024	CAAGGCU G AGACUCC	1036	GGAUUCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGCCUG	3336
1027	GGCCGAC G ACUCCUG	1037	CAAGGAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUACGCC	3337
1048	CUUUGU G ACUUCUG	1038	CAGAGAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAAGAAAG	3338
1092	UUUCCU G CAGUUG	1039	CGAGCUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGAGAA	3339
1105	UUUUGU G CUGGUCU	1040	GAAGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCACAA	3340
1129	ACAGAUU G AAGUCCU	1041	CAGCAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGACUGU	3341
1134	UCUAGU G CUGGCCU	1042	GAAGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACUUCGA	3342
1158	GGAGAUU G ACUUGU	1043	CGAUAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGUCUC	3343
1174	GAGUUC G ACCAUUG	1044	CGAUUGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAUACUC	3344
1182	GACACU G CGUAGUC	1045	GUUACAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGUGUC	3345
1234	GUUUAU G AGUGAUC	1046	GAUCACU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAUAUUC	3346
1239	UAUGAGU G AUCAUUG	1047	ACAAUAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCUCAU	3347
1248	AUUAUGU G CGUUGUA	1048	UCCACCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACAUAU	3348
1275	CAGAUUC G AAAUGGA	1049	UCCAUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAUCCUG	3349
1286	AUUGACU G CAAGAGC	1050	ACUUCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCCCAU	3350
1303	ACACUAGU G ACAAGAC	1051	CGUUCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUUAU	3351
1344	CUUUGU G CCGAGAA	1052	UUCUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAACGAAG	3352
1360	AGUUAU G AGUUGCA	1053	UCCAGCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAACACU	3353
1366	UUUAGCU G CAGUCAA	1054	UUUAGCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCUUCA	3354
1411	AGUUGCU G AUUGUUC	1055	GAUACCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGGAUC	3355
1442	CGUGGCU G CUGGACG	1056	CUUCCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACACACG	3356
1504	UAUUGGU G AGGUUAC	1057	GGUACCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCCAUA	3357

Table 23

1526	GUCCUUC G CAUCACCA	1058	UGGUAUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGAGAC	3358
1542	AUCCUUC G CAGCAUA	1059	UAUUGCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGAGAU	3359
1554	CAUUAUUC G CGGCGAU	1060	ACTUGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGUUUG	3360
1588	CCGAGAC G ACCTUUA	1061	GUACAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUUUGGG	3361
1603	ACAGUUU G CCNUUCA	1062	UGAGAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAACUUG	3362
1672	UUUUCUU G AUUGGAC	1063	GGCCGUA GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGCCGA	3363
1682	UCGGGCC G AAAGGA	1064	AGCCAAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUUUCGG	3365
1688	CCGAAAC G AAUUGGU	1065	CGUGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAAGCAA	3366
1699	UGGCUU G CUGUAGC	1066	AUGGCAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGACAG	3367
1708	CUGAGAC G CUUUCAU	1067	GCAUAUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACUUGCA	3368
1712	CAGCCUU G CCAUUC	1068	UCAUUGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUGACAU	3369
1719	UGCCAUU G CAGAUUA	1069	GAUUAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3370
1723	AUGGCAC G AUGAUUC	1070	CCUGAAC GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3371
1726	UGCAGAU G AGUUCAG	1071	GGUUAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3372
1807	AGACAAU G AGUCAA	1072	GUUAUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3373
1821	ACCCUUAU G ACCUAUC	1073	CGAUUGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCCAUUA	3374
1843	UCAUGGU G CAUUCUC	1074	CGAGUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAUUGCA	3375
1850	UGCAUUC G GCGCCUU	1075	AGAGGGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CGAGUUG	3376
1852	CGAUUCU G CCGUUCU	1076	GAAGAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGAGAG	3377
1863	CUTUUAU G CUUCCAU	1077	AGUGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCAUUA	3378
1866	UUCAUUCU G CCGUUCU	1078	CHAGUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAUUGC	3379
1874	GCACUUCU G CUCUAUUG	1079	CCAUAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GCACUUA	3380
1895	UCAUGUC G CUGCUUC	1080	GGAGGAG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCGUCC	3381
1898	GUGGCUU G CUUCCGU	1081	AGCGAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGGCGC	3382
1904	CUCCUUC G CCGUCCU	1082	GGCGAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCGAGG	3383
1907	CGUCCU G CCGUGCC	1083	UGCUUGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGCGAG	3384
1911	CGUCCU G CCGCAGA	1084	CGUCUGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GAGGCGC	3385
1913	CUUCUUC G CGAGAAC	1085	GGUCUGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCU	3386
1924	AGCGAUU G AUAUUAU	1086	AACTUUA GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCU	3387
1927	ACCAUUAU G ACUUGCU	1087	ACCAUUA GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAUUGUA	3388
1933	AUGAUUAU G CUGAGAC	1088	GUUAUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGAGUA	3389
1936	AUUAUUCU G CUGAUUC	1089	GAUUAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3390
1939	UUGUUAU G AUAUUC	1090	GGAGUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUGUCA	3391
1950	AUUCUUCU G CUGAGUG	1091	CACUUAU GAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGAGUA	3391

Table 23

1953	UCCUGCU G AAGUGAG	1092	CCUCACU GGAGAAAUCC CU UCAAGGACAUUCUCCGG AGCAGGHA	3392
1958	GUGAGU G AGGAGCC	1093	GGCCUUC GGAGAAAUCC CU UCAAGGACAUUCUCCGG ACUCUAC	3393
2087	CACCAAU G CCUCUCC	1094	GGCAGGG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUUGGUG	3394
2093	AUGCCU G CCUGAAG	1095	CAUCAGG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGAA	3395
2098	UCUGCU G AUGAGAA	1096	UUCUCCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGAA	3396
2179	AGCAUUC G CUGGCGG	1097	CCGCCAG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGUG	3397
2227	GAUAUCU G CUGGUGA	1098	UCAAGCG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAAUUC	3398
2230	AUUCUGU G CUGGAAC	1099	GUUCGAG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGCAGAA	3399
2234	UGUGCU G AAUCUUA	1100	UGAAGUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGAA	3400
2248	UGAGCCU G AACCUUG	1101	CMAAGUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGGCCUA	3401
2329	CAUCAGC G CAGGUAC	1102	GUAAUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GUGUGAG	3402
2393	GUUCCCU G CUGGCCA	1103	UUGGCCG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGGGAAC	3403
2419	GAGAGAU G CACAGUU	1104	AAACUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUCCUUC	3404
2428	CACAGUU G CUUAUUG	1105	GCMAUAG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAACUUG	3405
2435	UGCUAUB G CUUAAGG	1106	CUCMAAG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAUAJGA	3406
2476	ACAUUGU G CAAGAUU	1107	AAUCUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACCAUUG	3407
2485	CMAAGAU G CCUCUGA	1108	UUAAGGG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAUCUUG	3408
2492	UGCCUUC G AAUAUAA	1109	UUUAUUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGGA	3409
219	GUCCGAG G UAGCGGC	1110	GCCGCCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUCCGCAC	3410
483	CUCUGCU G UGGAUUG	1111	CCUAUUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGCAGAG	3411
634	AGGAGU G UGGAGUG	1112	CAUUGCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAAGUUC	3412
804	AGGACGU G UCGAGAC	1113	GUGUGGA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGCUCCU	3413
835	GGAAGGU G UGUUUGU	1114	CACUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUCCGCC	3414
877	AGGGUUG G UAUUGUC	1115	GGCAUUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACACCCU	3415
841	GUGUGU G UGCCUAC	1116	GUAGGCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUACAC	3416
919	ACUCACU G UGCCUAC	1117	GCNUCCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGUGACU	3417
1100	CGAGCUU G UGGUGUC	1118	CAGGACA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAAGGCU	3418
1144	UGCCUUC G UCGAGAG	1119	CCUCCGA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGAGGCA	3419
1185	CACUGCU G UACAGAG	1120	CUUGUGA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGCAGUG	3420
1246	UGAUCUU G UGGUGUG	1121	CAUCCGA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAGUAUA	3421
1315	AGAGCAU G UGGACAGU	1122	ACUUGCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAUUCUU	3422
1356	AAAGAGU G UUGUAGC	1123	GCUCAAA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUCUUC	3423
1440	CACUGUG G UGUUGGA	1124	UGCCAGA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACACAGU	3424
1570	UGGAGAU G UGGCCAG	1125	CGUGCCA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUUCUUA	3425

Table 23

1592	AGAGGACU G UUAACAGU	1126	ACUUGUAA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUCGUU	3426
1630	CGAGGACU G UUAUAGGA	1127	UCCCAUAA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUCGCG	3427
1642	UGGAGGCU G UUAUUAUG	1128	CNUGUAA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUCUCCA	3428
1666	UUAAGGCU G UUAUUAU	1129	AUAUAA GAAGGAAACUCC CU UCAAGGACAUUCUCCGG AAGUAGA	3429
1702	GUUUGCU G UUAUUAUG	1130	AGGCUGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUAAGC	3430
1717	CUUUCAGU G UGAACCAU	1131	AUCUGCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGCCAG	3431
1759	GCCUACU G UGAUUAUG	1132	CAAGGUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AAAGAGC	3432
1781	GGAGGACU G UGGUUAUG	1133	UUUAGCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ABUQUCC	3433
1834	GUAGCAU G UGUUAGCU	1134	AGCCAU GAAGGAAACUCC CU UCAAGGACAUUCUCCGG AUAGGUA	3434
1884	CUAAGGU G UGUUAGCU	1135	CACUACA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACACCAU	3435
1886	CAUUGGU G UCAUUGCC	1136	GCCACUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUUAACA	3436
2048	UGGACCU G UGGCCAGA	1137	UCUGCCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUUAACA	3437
2139	CAGGACU G UACCUUUA	1138	UACAGUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUCCUG	3438
2145	CUUAGCU G UAGGAAC	1139	GUUUCUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUUAAG	3439
2256	GAACUUU G UCAACCAU	1140	AUUAUUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AAAGUUC	3440
2346	CUUGGCU G UGUUCCUG	1141	CAGGACA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCCAAG	3441
2348	UGGUGGU G UCCUGUCC	1142	CACAGGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACACCCA	3442
2354	GUUUCUU G UGUUAUCC	1143	GGUUAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAGAAC	3443
2385	CAAGGCU G UUUUCCUG	1144	CAGGAAA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AAGUUGG	3444
2453	CAGGACU G UUAUAACA	1145	UUUUUUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUUCUG	3445
14	GUUCGCA G CCGUCCG	1146	CGGCGGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUGCGAG	3446
26	GCCCGGA G CUGCGAGC	1147	GUUGCGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCCGGC	3447
31	AGUUGCA G CCGCGAGC	1148	GUUGCGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCGAGCU	3448
40	AGUUGCA G CUGUAUA	1149	UUAUCCG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCGCGU	3449
51	GAUUUAG G UGUUUAUA	1150	UACGCCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUUCU	3450
54	UUAUUGU G CUGUAGCA	1151	UUCUAGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CACUAUA	3451
60	UGGCUUA G CAGCCAAC	1152	GUUGUUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAGGACA	3452
63	CUUAGCA G CACACAC	1153	UUGUUGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGUUUGG	3453
72	CACAGCA G CCGUAGUA	1154	UCUUGCG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUGCGAG	3454
81	CCGAGGA G CCGGAGAC	1155	GUUUGUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCGAGU	3455
88	AGCCCGA G CCGUUGCC	1156	GCGAGGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCGAGU	3456
134	CAAGGAA G CCGGACCC	1157	GUUGCGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCGUGG	3457
144	CGCACCG G CCGGACCC	1158	AUGCGGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCGAGGCG	3458
167	CCUUCUA G CCGGCGCG	1159	CUUGCGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUGGAGG	3459

Table 23

179	GGCGGGA G CCGCGCC	1160	GGCGGGA GGGGAAAUCC CU UCAAGGACAUCCGUCGGG UCCGCGG	3460
198	CUGCGCG G CUGCGCG	1161	GGGCGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CUGCGCG	3461
202	CAGGCUG G CGCGCGC	1162	GGGCGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGGCUG	3462
211	CGCGCGC G UCGCGAU	1163	CAUCGCA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CGCGCGG	3463
222	CAGGCUG G CGCGCGC	1164	GAGCGCG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UCAUCUG	3464
226	UGAGCGG G CUCGGAU	1165	AUCGCGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CGCGCUA	3465
239	GGUCCCA G CCUCUCC	1166	GGGAGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UGGUAUC	3466
256	CUUCUCC G UGUCUCC	1167	CGAGACA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG GGGACAG	3467
290	UCCUACA G CCGGACC	1168	GGUCCGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UUGGAGA	3468
304	ACCUGGG G CUGGCGA	1169	UGGCGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGCGCC	3469
308	GGGGCUG G CCGAGGC	1170	GGCUCGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGCGCC	3470
315	GGCGGAG G CCGUGAG	1171	CUGCGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CUGGAGG	3471
324	CCUUGCG G CCGUGGG	1172	CGCAGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CUGGAGG	3472
330	AGCCUUG G CGUCCGA	1173	UAGGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CGGAGCC	3473
332	GGCUGGC G UCUUGAG	1174	CAUCAGA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGCGCC	3474
348	GGCCCAA G CUCCUUC	1175	AGAGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UUGCGGC	3475
365	CGGAGAA G CACACAC	1176	CGUGGUG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UUCGCGG	3476
372	AGCACCA G CACACCC	1177	GGUGGUG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UGGAGGU	3477
391	ACUUGGG G CAGGCGC	1178	GGCGCUG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCGCAAGU	3478
395	GGGGCAG G CGCCAGG	1179	CGCUGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CUGCGCC	3479
410	GGCGGAC G UGGCCAG	1180	CUGGCCA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG GACCGUC	3480
414	GGACUGG G CCGUGGC	1181	CGCACUG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UGGCGAC	3481
418	GUGGCCA G UGCGAGC	1182	GGCUGCA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGCGCC	3482
424	CAGGCGA G CCGAGAG	1183	CGUCUGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCGCUGG	3483
433	CCGAGAG G CCGAGAG	1184	CGUCGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCGCUGG	3484
441	CGCCGAG G CGCGGCC	1185	GGCCCCG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CUGCGGC	3485
447	AGCCCGG G CCGACAU	1186	AUGGUGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCGCGCC	3486
457	CCACAGU G CCGAGCC	1187	GGCUGGG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGUGUG	3487
463	UGGCCAA G CGUGGCC	1188	GGCGGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UGGCGCA	3488
474	CUGCCUUG G CUCUGUC	1189	AGCGGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CAGCGAG	3489
491	GUUGAUG G CGCGGAG	1190	CUGCCCG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCAUCAC	3490
499	CGCGGGA G UGUCUGG	1191	AGCGACA GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UCCCGCC	3491
515	UGGCCAG G CACCGAC	1192	GCUGGAG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG CCGUGGCA	3492
522	GGCACCA G CAGCGCAU	1193	AUGCGUG GAGGAAAUCC CU UCAAGGACAUCCGUCGGG UGGGCGC	3493

Table 23

527	CCAGCAG G CAUCGCG	1194	GCCGAGUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CGUAGUGG	3494
534	GGCAUCG G CUGCCCU	1195	AGGGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CGGAAUCCG	3495
548	CCUGGCCA G GAGCUGG	1196	CGAGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGGCGAGG	3496
551	GGCAGCG G CCGGGGGG	1197	CCCCGAG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CGGUCGCG	3497
560	CCUGGGCG G CGCCCCCC	1198	GGGGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCGCCAGG	3498
573	CCCGGGG G CUGCGGU	1199	AGCGCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCGAGGCG	3499
579	GGGUGCG G CUGCCCGG	1200	GGGGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CGAGCCG	3500
603	GACGAGA G CUGCGCGG	1201	UCGTCGG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UCUUGUC	3501
612	CCCGAGGA G CCGGGGCG	1202	CGCCCGG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UCGUCCGCG	3502
617	GGAGCCG G CGGAGGG	1203	CCGUCGG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CGGGUCCG	3503
626	CGAGGGG G CAGUUGG	1204	CAAGCUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCUUCGCG	3504
629	GAGGGGCA G CUGUGUGG	1205	CCACAGG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGGCCUCC	3505
643	UGGAGUG G CAGACAC	1206	GUUGCCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CAUUCUCC	3506
659	CCUGAGGG G CAGUCUGG	1207	CCGACUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCGCAGG	3507
663	AGGCGGA G UCGGGGCA	1208	UGCCCGA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UUGCCCGU	3508
669	AGUCGGG G CAGGGGCA	1209	UAGCCUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCGACUUI	3509
674	GGGGAGG G CUACUAG	1210	CGUAGAG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CUGGCCCC	3510
682	GCACUAC G UGGAGUG	1211	CAUUCGA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG GAGGAGCC	3511
694	AGAUAGC G UGGGAGC	1212	GCUGCCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG GUAUAGU	3512
698	GACGUGG G CAGCCCC	1213	GGGGGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CACAGUUC	3513
701	CGUGGGG G CCCCCCG	1214	GGGGGGG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGGCCAGG	3514
727	ACAUCCG G UGGAGUACA	1215	UGAUCCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CAGGAUUG	3515
737	GGAUACG G CAGCAGUA	1216	UAUUCUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CUGBAUCC	3516
740	UACAGCA G CAGUACU	1217	AGUUAUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGCCUAGUA	3517
743	AGCGGCA G UACUUGG	1218	CAUAUUA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGUGCUU	3518
754	ACUUUGCA G CUGGUGUG	1219	AGCACCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGCAGAGU	3519
758	UGCAGUGG G UGUGGCC	1220	GGGAGCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCACTUGCA	3520
798	UACGAGG G CAGCUGUC	1221	GACACUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CUUGGUA	3521
801	CAGAGCA G CUGUCAG	1222	CUGGACG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGCCUUGG	3522
809	GCUGUCCA G CACAUAC	1223	GGUUGUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UGCACAGG	3523
813	CCGAGAG G UGUUGUG	1224	CAUAACA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CCGUCCCG	3524
857	CACCGAGG G CAGUGAGG	1225	CCCAUUG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG CUGGAGUG	3525
861	CAGGCGA G UGGAGGG	1226	CCUUGCA GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UUGCCUUG	3526
873	UGGGGGA G CUGGGGAC	1227	GUGCCAG GAGGAAACUCC CU UCAAGGACAUUCUCCGCG UCCGCCUUC	3527

Table 23

878	GGAGCUG G CACGACG	1228	GGTCGUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGUCUCC	3528
889	CGAGCUG G UAGCAUC	1229	GAUCUUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGUCUGG	3529
893	CCUGGUA G CAUCCCC	1230	GGGGAUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UAUCAGG	3530
905	CCCCAUG G CCCCACG	1231	CGUUGGG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAUGGGGG	3531
913	GGCCCAAC G UCACUGUG	1232	CACAGUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG GUUGGGGC	3532
923	CACUUGC G UGCCACA	1233	UGUUGCA GGAGGAACUCC CU UCAAGGACAUUGUCCGG GCACAGUG	3533
957	UCAGCAA G UCUUCAA	1234	AUGAAGA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UGUUUGUA	3534
971	CAUACAG G UCUUAAU	1235	AGUUGAG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CGUUGUG	3535
986	CUUGGAG G CAUCUGG	1236	CCAGGAUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CUUCCGAG	3536
996	AUCCUGG G CUGACUUA	1237	UAGGCCG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGCCCA	3537
1000	UGGGCUG G CCUAUGU	1238	AGCAUAG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CUGUCAAU	3539
1020	AUUGCAG G CCUGACGA	1239	UGGUCAG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCAGGGA	3540
1038	UCCUGCA G CUUUUUU	1240	AAGAAGG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGAGAU	3541
1057	ACUUCUG G UAAAGAG	1241	CGCUUUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UAUACAG	3542
1062	CUUGTAA G CAGACCA	1242	UGGUAUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG GUUGGUU	3543
1072	AGCCCAAC G UUCCAAC	1243	GUUGGAA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UGCAGGA	3544
1095	UCCUGCA G CUUUGUG	1244	CCCAAGG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UGCAGGA	3545
1103	GUUUGUG G UGUUGGU	1245	AGCCAGCA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CACAAAC	3546
1109	UGGUGUG G CUUCCCC	1246	GGGGGAG GGAGGAACUCC CU UCAAGGACAUUGUCCGG GAGCACA	3547
1125	CUAACCA G UCUGAAGU	1247	ACUICAGA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UGGUUGAG	3548
1132	AGUUGAA G UGUUGCC	1248	GGCCACA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGCACUU	3549
1138	AGUUGUG G CCUCUGU	1249	GACAGAGG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCUCCUG	3550
1154	CGAGGGA G CAUGAUC	1250	UGAUCAUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG CUCACAG	3551
1169	CAUGGAG G UAUGGAC	1251	GGUICUAU GGAGGAACUCC CU UCAAGGACAUUGUCCGG CUGUUAU	3552
1193	GUACAG G CAGUCUU	1252	AGAGCUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCUUGUG	3553
1196	CACAGCA G UCUUGGU	1253	ACCAAGA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CAGAGAU	3554
1203	AGUUCUG G UAUAACG	1254	GGUUAUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CGAGUGG	3555
1218	CCCAUUG G CGAGAGG	1255	CACUCCG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCUCCUG	3556
1224	CGGCGAA G UGUUUUA	1256	UAUAUCA GGAGGAACUCC CU UCAAGGACAUUGUCCGG CACUCCCG	3557
1227	CGGAGUG G UAUAUAU	1257	UCAUAUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCUUAU	3558
1237	AUAUAG G UGAUAUJ	1258	UAUAUAU GGAGGAACUCC CU UCAAGGACAUUGUCCGG CGGACAA	3559
1252	UGUGCGG G UGGAGUJ	1259	GAUCCCA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCUUGCA	3560
1293	UGACAGA G UACACUA	1260	UAUUGUA GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCCUUGCA	3561
1310	UGACAGA G CAUUGUG	1261	CCCAUUG GGAGGAACUCC CU UCAAGGACAUUGUCCGG UCUUUGCA	3561

Table 23

1322	UGUGGACA G UGUGACCA	1262	UGUGGCCA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGUCCAA	3562
1325	GGACGACA G CACACCCA	1263	UGUGUGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CACUUCUCC	3563
1340	CACCUUC G UUGUCCCA	1264	UGGGGAAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG GAAGUGUG	3564
1354	CCAGAAA G UUGUGAAA	1265	UUCNAAAC GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUUUUGUG	3565
1363	UGUUGAA G CUGCAGUC	1266	GACUGCAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUCNAAAC	3566
1369	AGCUGCA G UCNANUCC	1267	GGAUUUGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACUGCU	3567
1384	CAUUGAG G CAGCUUCC	1268	GGAGCUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CUGUUGUG	3568
1387	UCNAGCA G CCUCUCC	1269	GGAGGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UBCUUGCA	3569
1404	CCAGGAA G UUCUCUGA	1270	UACAGGAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUCUCCGU	3570
1415	CCUUGAUG G UUUUGGAC	1271	GCCAGAAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CAGNAAUCC	3571
1422	GGUUUUG G CUGAGGAA	1272	UCUCCUUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UCUCCUUG	3572
1431	CUGAGGAA G CAGCUGUG	1273	ACACUGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGCUUCC	3574
1434	GGAGGACA G CUGUGUGU	1274	CACACGAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CAGCUGCU	3575
1438	AGCAGUG G UUGUCUGG	1275	CCAGCACA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CAGCAGAC	3576
1446	GGUGUG G CAGCGAGG	1276	CCUGCUUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UAGCCAGC	3577
1450	GUUGGCNA G CAGCGACC	1277	GGUGCUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGUUGUG	3578
1454	GCAGCAG G CACCAUCC	1278	GGUGUGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGGAAAA	3579
1480	UUUUGCCA G UCAUUCUA	1279	UGAGUUGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CCAUUGAG	3580
1502	CCUUAUG G UGAGGUUA	1280	UACUUCUA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CUCACCCA	3581
1507	UGGUGAG G UUAUCCAC	1281	SUUUGUUA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGUUGU	3582
1518	ACCAACCA G UCCUUCUG	1282	CGNAGGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGCAGGAG	3583
1545	CUUCCGCA G CAAUUCUA	1283	AGUUAUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGCAGGUA	3584
1557	UACUUGG G CAGUGUGA	1284	UCCACUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGCACGCA	3585
1561	UGUGGCCA G UGUGAGAU	1285	AUCUUCUA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CACAUUU	3586
1573	AAGAUUG G CACAUUCC	1286	GGACUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CAGUUGU	3587
1578	GUUGGCAC G UCCCAACA	1287	UCCUUGGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGUCCAC	3588
1599	UUUUAACA G UUUUGUUA	1288	AUGGCAAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UUGUAGAU	3589
1614	AUCUACA G UCUUCCAC	1289	GUGGUAUGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CCGUUGAU	3590
1625	AUCCACG G CACUUGUA	1290	UACACUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UCCCAUAA	3591
1639	UUUUGGCA G CUUUUUC	1291	GAUACAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CUUCUUG	3592
1655	CAUGGAG G CUUUCUAG	1292	CCUAGAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGAGAGAC	3593
1663	GCUCUAC G UUXUUCUU	1293	AAAGACAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CCGAUACA	3594
1678	UGUUGG G CCGGAAAA	1294	UUUUCGGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CCGAUACA	3595
1694	ACGAUUG G CUUUGUG	1295	CAGCAAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG CAAUUGU	3595

Table 23

1706	UGCAGUCA G GCGUUGCC	1296	GGCAAGGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3596
1728	CACAGUCA G UGUGAGC	1297	GUUCUAGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3597
1738	UCAGAGAG G CAGCGUGG	1298	CACCGUUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3598
1741	GGACGGCA G CGGUUGAA	1299	UUCACCGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3599
1744	CGGACAGG G UGGAAGGC	1300	GCUCUCCA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3600
1751	GGUGAGAG G CCGUULUG	1301	CAAAAGGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3601
1784	AGCAGUCA G CUCACACA	1302	UGUGUAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3602
1809	ACAGAGAG G UGACACCU	1303	AGGUUGUA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3603
1828	UGACACUA G CCAUAGUC	1304	GACUUGGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3604
1840	AUGUAGG G CUGGCAUC	1305	GAUGGAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3605
1882	CCUCUAG G UGUUUGAG	1306	CUGACACA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3607
1890	GUUGUAGA G UGGCGUCU	1307	CACGCGCA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3608
1893	UGUCAGUG G CGCUUGCU	1308	AGGACAGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3609
1917	CUCCGCCA G CAGUAUGA	1309	UCAUGCUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3610
1920	CGCGAGCA G CAGUAUGA	1310	CCUCUAGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3611
1956	GUUGUAGA G UGAGGAGG	1311	CCCAUGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3612
1964	GUAGAGAG G CCGAUGGG	1312	AUCUUCUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3613
1972	GCCCAUGG G CAGAAGAU	1313	GUAGACCA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3614
2006	ACACUUGG G UGUUUGAC	1314	AAAGUGUA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3615
2009	CCUCUGUG G UUCACUUC	1315	ACUUGUGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3616
2019	UCACUUGG G UGACAGU	1316	GUUCUAGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3617
2026	GGUACAAA G UAGGAGAC	1317	CACAGGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3618
2042	CACAGUG G CACUUGUG	1318	UGUCUUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3619
2051	CACUUGUG G CAGAGCA	1319	CUGAGGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3620
2057	UGGCCAGA G CACUUGAG	1320	CUUGCCAG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3621
2114	AGGAAAGG G UUGGAGAG	1321	CCACUUGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3622
2118	AAAGGUGG G CAAAGUUG	1322	GGAAACCA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3623
2123	CUUGCAGG G UGGUUGUC	1323	CCUUGGAA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3624
2127	CAGAGUGG G UUGCGAGG	1324	GGAGGUG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3625
2172	AGAAAGGA G CACUUGUC	1325	UAUUCGCG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3626
2183	CUCUCUGG G CGGGAUAC	1326	UGAGGUGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3627
2198	UAUCUUGG G UCAACUUA	1327	UUUCCGGA GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3628
2214	AAAUUUGA G UGGGAAAG	1328	GUUCAGGG GGAGGAAAUUCC CU UCAAGGACAUUGUCCGGG UGACAGCA	3629
2243	AAAUUUGA G CUCUGAAC	1329		

Table 23

2288	MACCAAA G UUUUUCUC	1330	GAAGAAUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAAGGAUU	3630
2305	UUUUUUA G UUUCAGAA	1331	UUUUUAAA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAAGAAUA	3631
2314	UUUCAGAA G UAUUGGCA	1332	UUGCCAAUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAAGAAUA	3632
2320	AAAGACUG G CAUACACG	1333	GUUUUAU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CAUAUUU	3633
2333	ACAGCGAG G UUAUUCUG	1334	CAAGUAU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CAAGUAU	3634
2342	UUAUUCUG G CGUUGUUC	1335	GACAGCA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GCGAGUU	3635
2344	UCCUUGGC G UUUUGUCC	1336	GGACACA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GCGAGUU	3636
2357	UCCUUGGC G UAUUUCUG	1337	CGAGGUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CACAGGA	3637
2365	GAAGUCCU G CAGAGAAU	1338	UUUUUUU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUGUUUC	3638
2381	GAGACCAA G CUUUUUUC	1339	GUAAUAG GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUGUUUC	3639
2397	CCUUCUG G CCAAGUUC	1340	GACUUUG GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CAGCAGG	3640
2403	UGGCGAAA G UAGUAGG	1341	CUUUCUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAUGCA	3641
2407	CAAGUUA G UAGGAGAG	1342	CUUUCUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAUGCA	3642
2424	GAUGACA G UUUUUUUC	1343	AUAGCAA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAUGCA	3643
2463	AUAAACA G CCAAGAU	1344	AUUGUAG GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUAUGCA	3644
2474	UUAUAUG G UGAAGAUA	1345	UUUUUUA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CAUUGUA	3645
22	GCUGCCCC G GAGUCUCC	1449	GCAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3646
23	CCGCGCG G GAGUCUCC	1450	GCAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3647
24	CGGCGCG G AGUUGGUA	1451	UUGAGUU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUGUGGC	3648
43	CGGAGUU G GAUAUUGG	1452	CCUUAUC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG AGUUGGC	3649
44	GGAGUUG G GAUAUUGG	1453	ACCUUAU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CAGUUGC	3650
53	AUUAUUGU G GCUUGGAG	1454	GAGGCGA GGAGAAACUCC CU UCAAGGACAUUCUCCGGG AUUAUUA	3651
78	CAGCGCA G GAGCCCGG	1455	GCUCAGC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG ACCUUAU	3652
79	AGCGGAG G AGCCCGGA	1456	CCGCGUC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUGUGGC	3653
85	AGAGCCC G AGCCUUUG	1457	UUGUGUC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CUGUGGU	3654
86	GGAGCCC G AGCCUUUG	1458	AAGGCUU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3655
119	GGCGCGG G GGGGAGC	1459	CAAGGUC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3656
120	GGCGCGG G GGGGAGC	1460	GGUCCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3657
121	CCGCGCG G GGGGAGC	1461	UUGUGUC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG GUGUGGC	3658
122	CCGCGCG G GGGGAGC	1462	CUUGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CUGUGGU	3659
123	CGCGGGG G GAGCAGG	1463	CUUGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CUGUGGU	3660
124	CGCGGGG G GAGCAGG	1464	CCUGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CUGUGGU	3661
125	CGCGGGG G GAGCAGG	1465	UCCUGUU GGAGAAACUCC CU UCAAGGACAUUCUCCGGG CUGUGGU	3662
129	GGGAGCA G GAGGCGG	1466	CGGCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGGG UUGUGGC	3663

Table 23

130	GGACACAG G AAGCCGC	1467	GGGCTTTC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUGGUCCC	3664
131	GGACACAG G AAGCCGC	1468	GGCGGCTU GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUGGUCCC	3665
143	CGCGACCC G GCGCGCC	1469	UGCGCGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GUGUGCGG	3666
175	GCCCGCCG G GCGCGCC	1470	GGGCGTCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGCGCGG	3667
176	GCCCGCCG G GAGCCCG	1471	GCGGGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGCGCGG	3668
177	CCCGCCGG G AGCGCGG	1472	CGCGGCTU GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGCGCGG	3669
197	CGCGCCCA G CGCGCGG	1473	CGGCGAC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGCGCGG	3670
201	CCGAGGCC G GCGCGCC	1474	GGGCGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGCUUGGG	3671
224	GAUGAGCG G GCGCGCC	1475	CCGAGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCUACAU	3672
225	AUGAGCG G GCUCCGA	1476	UCCGAGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CGCUACAU	3673
231	CGGCGUCC G GAUCCGAG	1477	CUGGGAUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GGAGCCCG	3674
232	GGGCGUCC G AUCGCGG	1478	GUUGGAU GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGAGCCC	3675
265	UGGCGUCC G GAUCCGCC	1479	GGGGAUUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGAGGCA	3676
266	GTCUGUCC G AUCUCCGC	1480	GGGGAUUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGAGGCA	3677
294	CAAGGCC G GACUCCGG	1481	CCGCGUUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGGUGUG	3678
295	CAAGGCC G ACCCGGG	1482	CCCGGCTU GGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGGUGUG	3679
300	CGGAGCCC G GGGGCUUG	1483	CAAGCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GGGUCCGG	3680
301	CGGAGCCC G GGGGCUUG	1484	GCAAGCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GGGUCCGG	3681
302	GGACCCGG G GCUUGGCC	1485	GGCAGCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CCGGCGUCC	3682
303	GACUCCGG G GCUUGGCC	1486	GGCGAGC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CCGGCGUCC	3683
307	CGGGGCGU G GCGCGCC	1487	CCUUGGAC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGCCCGCG	3684
313	CGGCGCCA G GCGCGCGC	1488	GAGGGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGGGCGCG	3685
314	UGGCGCAG G GCGCGGCA	1489	UGCAGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUGGGCCA	3686
323	GCCUUGCA G GCGCGGCC	1490	GCGAGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGCAGGCC	3687
329	CAGGCGCU G GCGCGCGC	1491	CAGGAGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGGCGCUG	3688
362	UCUCUGGA G AAGCGACC	1492	GUGGCTTU GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGGCGCUG	3689
382	ACCAACCA G ACUUGGCG	1493	CCCAAGU GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGGUGUGU	3690
387	CGAGAGTU G GGGGCGAG	1494	CTUGCCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AAGUCUGG	3691
388	CAGACUUG G GGGGCGAG	1495	GCGUCCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CAGUCUGG	3692
389	AGACUUGG G GCGAGGCC	1496	GCGUCCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CAGUCUGU	3693
390	GACUUGGG G GCGAGGCC	1497	GCGUCCCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CCGAGGUC	3694
394	UGGCGGCA G GCGCGCAG	1498	GUCCGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGGCGCUC	3695
401	AGCGGCCA G GCGCGGAC	1499	GUCCGGCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGGCGCUC	3696
402	GCGCGCAG G GAGCGAGC	1500	CGUCCGGC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUGGCGCC	3697

Table 23

403	GGCGACG G AGCGAGU	1501	AGUUCGU GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CUUCGCGC	3698
406	CGAGGAC G GAGUUGG	1502	CCAGGUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GUUCUUG	3699
407	CAGGACG G AGUGGAC	1503	GGCCACGU GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CUUCUUG	3700
412	AGGAGCU G GGCGAGU	1504	CAUUGCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG AGUUCGU	3701
413	CGAGAGU G GCGAGU	1505	GCAUUGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CAGUUCG	3702
423	CGAGGCG G AGGAGCG	1506	GGGCGCU GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG UGAGUUG	3703
431	AGCCAGA G GGCGGAA	1507	UUCGCGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG UGAGUUG	3704
432	GGCCAGG G GGCGGAA	1508	CUUCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CUUCGCG	3705
440	GGCCGAA G GGCGGCG	1509	GGCCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG UGUCGCG	3706
444	CGAGGCG G GGCGGAC	1510	GUUGGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GCGUUCG	3707
445	GAGGCG G GGCGGAC	1511	GUGGCGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GCGUUCG	3708
446	AGGCGG G GGCGGAC	1512	UGUGGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGGCGU	3709
456	CGACGAG G GGCGGAC	1513	GUUGGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG AGUGGCG	3710
473	CGUGCGU G GGCGGCG	1514	CGAGGAG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG AGGCGAG	3711
485	CGUGCGU G GAGUGCG	1515	GGCCGAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG ACAGGAG	3712
486	CGUGCGU G AGUGGCG	1516	GGCCGAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CAGAGAG	3713
489	CGUGGAGU G GGCGGCG	1517	CCGCGCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG AUCCGAG	3714
490	UUGGAGU G GGCGGCG	1518	UCCGCGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CAUCCAG	3715
495	AGUGGCG G GAGUGCG	1519	AGCACUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GCGCCAU	3716
496	UGGCGCG G GAGUGCG	1520	CAGCACUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GCGCCAU	3717
497	GGGCGCG G AGUGGCG	1521	CGACGCU GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGGCCU	3718
514	CGGCGCG G GCGGCGC	1522	CGGUGUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GUGGCGG	3719
526	CGGCGCG G GCGGCGC	1523	CGGUGUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GUGGCGG	3720
533	CGGCGCG G GCGGCGC	1524	GGGCGAG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GAUCCCG	3721
550	UGGCGCG G GCGGCGC	1525	CCGCGAG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG GAUCCCG	3722
555	AGCGCGU G GGCGGCG	1526	GGCCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG AGGCGCU	3723
556	GGGCGCG G GGCGGCG	1527	GGCGCGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CAGGCGC	3724
557	CGGCGCG G GCGGCGC	1528	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CAGGCGC	3725
558	GGGCGCG G GCGGCGC	1529	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3726
559	GGGCGCG G GCGGCGC	1530	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3727
570	GGGCGCG G GCGGCGC	1531	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3728
571	GGGCGCG G GCGGCGC	1532	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3729
572	GGGCGCG G GCGGCGC	1533	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3730
578	GGGCGCG G GCGGCGC	1534	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGUCGAG CCGAGCG	3731

Table 23

587	GUUCGCC G GAGACCG	1535	CGUCUCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGCGGAC	3732
588	CUUCGCC G GAGACCG	1536	UCGUCUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CGGGGCG	3733
589	UGCCGCC G AGACCGC	1537	GUUGUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CCGGGGA	3734
591	CCCGGCA G AGCCGAG	1538	UCUGCGU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCCCGGG	3735
601	CCGAGGA G AGCCGAG	1539	CUUGGCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCCCGGG	3736
609	GAGCCGA G GAGCCGG	1540	CGGGUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGGUC	3737
610	AGCCGAG G AGCCGGC	1541	GCGGGU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGGUC	3738
616	AGGAGCC G GCGGAGC	1542	CCUCGGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGCGGCU	3739
620	CCCGGCC G GAGGGCA	1543	UGCCGUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGCGGGC	3740
621	CCCGGCC G GAGGGCA	1544	CUUGCCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGCGGGC	3741
623	GCGCGA G GCGGACU	1545	AGCUGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGGCG	3742
624	GCGCGAG G GCGAGCU	1546	AGCUGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGGCG	3743
625	GCGGAG G GCGACUU	1547	AAAGCUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUCGGC	3744
636	AGUUUGU G GAGUGGU	1548	ACCAUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACNAAGC	3745
637	GUUUGU G AGUUGU	1549	CACCAUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CACAAGC	3746
639	UUUGGA G AUGUGGA	1550	UCCACAU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGMA	3747
642	GUUGAGU G UUGAGCA	1551	UUUCGAC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUUCGAC	3748
645	GAGUUGU G GACACCU	1552	AGGUUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACCAUUC	3749
646	AGUUGU G AGACCUU	1553	CAGUUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CACAUUC	3750
656	CACUGA G GCGAGU	1554	ACUUGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCAUGU	3751
657	AACUGAG G GCGAUGU	1555	GAUCUCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCAUGU	3752
658	ACUUGAG G GCGAUGU	1556	GCACUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUCGUC	3753
665	GCGAGU G GCGAGG	1557	CCUUGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GACUUGC	3754
667	GCAUGU G GCGAGGC	1558	GCCUUGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GACUUGC	3755
668	CAUGUGU G GCGAGU	1559	AGCCUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GCGACUG	3756
672	UCGGGCA G GCUACUA	1560	UAGUAGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UGCCCCA	3757
673	CGGGGCA G GCUACUA	1561	GUAGUAC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUCCCG	3758
684	UCUUGU G GAGUAGC	1562	GUACUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUUGUA	3759
685	ACUUGU G AGUAGU	1563	GGUACU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CAGUAGU	3760
687	UACUGGA G AUGACCGU	1564	ACGUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCCAGUA	3761
696	AUGACCGU G GCGAGCC	1565	GGCGUCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUGUAC	3762
697	UGACCGU G GCGAGCC	1566	GGCGUCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUGUAC	3763
711	CCCGGCA G AGUUGA	1567	UUGAGU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCGGGG	3764
726	ACAUCCU G GCGAUC	1568	GUACUCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AGUUGU	3765

Table 23

729	AUCCUGU G GAUACAG	1569	CCUUAUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG ACAGAU	3766
730	UCCUGUG G AUACAGC	1570	GCUGUAU GGAGAAACUCC CU UCAAGGACAUUCUCCGG CACAGAA	3767
736	UGAUAACA G GAGACAU	1571	ACUGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGUUAUCA	3768
756	UUUGCAGU G GUGUCCG	1572	GCAGACC GGAGAAACUCC CU UCAAGGACAUUCUCCGG ACUGCAAA	3769
757	UUCAGUG G GUGUCCG	1573	GCAGACC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CACUGCA	3770
795	UACUACA G AGCAGCU	1574	AGUGCCU GGAGAAACUCC CU UCAAGGACAUUCUCCGG UGUUAGUA	3771
797	CUACAGA G GCAGUGU	1575	ACAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GGUUAGU	3772
818	CACUAACC G GCAGUCC	1576	GGAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CGUUAUUG	3773
819	ACAUAACC G GACUCCG	1577	CGAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CCGUUAUG	3774
820	CAUACGG G ACUCCGG	1578	CACCUUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG GGAGUCC	3775
821	GGACUCC G GAAGUGU	1579	ACACCUU GGAGAAACUCC CU UCAAGGACAUUCUCCGG CGAGUCC	3777
828	GACUCCG G AAGGUGU	1580	UACACCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG UUCUGAG	3778
831	CUCCGGA G GGUUGUA	1581	AUACACAC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUUCUGA	3779
832	UCCGGA G GUGUGUA	1582	CACUCCG GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUUGUGUA	3780
855	UACACCA G GGCAGUG	1583	CCAUUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUUGUGU	3781
856	ACACCA G GGCAGUG	1584	CCCUUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG ACUUGCC	3782
863	GGCAGU G GGAUGGG	1585	UCCCUUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CACUUGC	3783
864	GGCAGU G GAGUGGA	1586	CUCCCUU GGAGAAACUCC CU UCAAGGACAUUCUCCGG CACUUGC	3784
865	GCAGUG G AAGGGAG	1587	CAGUCCG GGAGAAACUCC CU UCAAGGACAUUCUCCGG UUCUCCAU	3785
868	AGUGGA G GGGAGUG	1588	CCAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUUCCAC	3786
869	GUGGAG G GGGAGUG	1589	CCAGUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CUUCCAC	3787
870	UGGAGAG G GAGUGGC	1590	GCACGUC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CCUUCUCC	3788
876	GGGAGAG G AGUUGGC	1591	UCCUUGC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3789
876	GGGAGU G GGCACCA	1592	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG CACUCCUCC	3790
877	GGAGUGU G GGCACAC	1593	AUCUCCG GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3791
888	ACGACCU G GUAAGCU	1594	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3792
904	UCCUCCAU G GCCTCAAC	1595	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3793
952	CUCAUACA G ACAUUGU	1596	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3794
970	UCUACAC G GUCUAC	1597	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3795
980	CUCAUACU G GUAAGGA	1598	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3796
981	UCUACACU G GUAAGGA	1599	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3797
982	CUCAUACU G GUAAGGA	1600	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3798
985	ACUGGGA G GUAUUGU	1601	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3799
993	GGUCCU G GGUUGCC	1602	GUCCUCC GGAGAAACUCC CU UCAAGGACAUUCUCCGG AGUCCUCC	3799

Table 23

994	GCATCCCG G GGCUGGCC	1603	GGCCAGCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAGGAUCC	3800
995	CAUCCUG G GCUAGCCU	1604	AGGCGAGC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAGGAUG	3801
999	CGGCGCU G GCCUAGCU	1605	GCAUGGCG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCCCGAG	3802
1011	UAUCCUG G AUGGCCAG	1606	CUGGCAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGCGAUA	3803
1019	GAUUGCA G GCUAGAG	1607	CGUACGCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGCGAUA	3804
1035	GAUCCUC G GAGCUU	1608	AAAGCUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGAGAU	3805
1036	ACUCCUG G AGCUUUC	1609	GAAGGCU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAGGAGU	3806
1056	GAUCCUC G GUAAGUC	1610	UGCUUAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAGUUC	3807
1065	GUAAAGCA G ACCCAGU	1611	AGUUGGCG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUUAU	3808
1102	AGCUHUG G GUGUGGC	1612	GCCAGCAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGUAACT	3809
1108	GUUGUCU G GCUUCCC	1613	GGGAGAGC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCACCAC	3810
1137	GAAGUCU G GCUUCCUG	1614	ACAGAGCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCAGUUC	3811
1147	CCUUCUC G GAGGGAGC	1615	GUCCUCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GACAGAG	3812
1148	CUCUUCG G AGGGAGC	1616	UGCUCCU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GACAGAG	3813
1150	CUGUCGA G GAGCAUG	1617	CAUCUCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCAGAC	3814
1151	UGUGGAG G GAGCAUG	1618	UAGUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUCGAC	3815
1152	GUGGAGG G AGCAUGAU	1619	AUAGUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUCGAC	3816
1165	UGAUCAU G GAGGUUAC	1620	GAUACUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AAUGAUA	3817
1166	GAUUAUG G AGUAUCC	1621	CGAUACU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUAUC	3818
1168	UAUUGGA G GUUUGAC	1622	GUGUAUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUAUA	3819
1192	UGUACACA G GAGUUC	1623	GAGUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGUUACA	3820
1202	CAGUCUC G GUUATAC	1624	GUGUAUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGAGACU	3821
1217	ACCAUCC G GCGGAGU	1625	ACUCCGC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GAUGUGU	3822
1220	CAUCCGC G GAGUGGU	1626	ACCACUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GCGGAGU	3823
1221	AUCCGCG G GAGUGGU	1627	UACCAUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGCGAU	3824
1222	UCGCGCG G AGUGUAU	1628	AUACCAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGCGGA	3825
1226	GCGGGAGU G GUUUAUG	1629	CAUATAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCUCCG	3826
1236	UAUUAUG G GUGUAU	1630	AUGATAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCAUAUA	3827
1250	CAUUGUC G GUGUAGA	1631	UCUCCAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GCACAUU	3828
1251	AUUGUCG G GUGGAUG	1632	ATUCCAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG GCGACAU	3829
1254	GUGCGGU G GAGUAUA	1633	UUGAUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACCCGAC	3830
1255	UGCGGUG G AGUAUUA	1634	AUUAUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCCGCA	3831
1257	CUGUGGA G AUUAUUG	1635	CAUAUUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCCCGCG	3832
1264	AGUAUUA G GAGGAGU	1636	AUCCUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUAUUC	3833

Table 23

1265	GAUCUAGU G ACAGGAUC	1637	GAUCCUGU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CAUUGAUC	3834
1269	AUUGAGCA G GAUUGA	1638	UUGAGUC GAGGAAACUCC GU UCAAGGACAUUGUCCGG UGUCCAUU	3835
1270	AUGAGCG G AUUGA	1639	UUUACAU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CUUUCU	3836
1281	CUAUAU G GAUCGAA	1640	UUUACAU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CUUUCU	3837
1282	UUAUAU G ACUGGAG	1641	CUUGAGU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AAUUUACA	3838
1290	GAUGCAA G GAGUACA	1642	UUGUACU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UUGGAGUC	3839
1291	ACUGCAA G AGUACAC	1643	GUUGAUC GAGGAAACUCC GU UCAAGGACAUUGUCCGG CUUGAGU	3840
1308	UAUGCAA G AGCAUUG	1644	ACAAUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UUGUUA	3841
1317	AGCAUUG G GACAGUGG	1645	CAUUCUG GAGGAAACUCC GU UCAAGGACAUUGUCCGG ACAUUCU	3842
1318	GAUUGUG G ACAGUUC	1646	GCCAUUG GAGGAAACUCC GU UCAAGGACAUUGUCCGG CACAUCU	3843
1324	UGGACAGU G GCACAC	1647	GUUGUUC GAGGAAACUCC GU UCAAGGACAUUGUCCGG ACUGUCA	3844
1350	UUGCCAA G AAGUGU	1648	AACAUUU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UUGGCGA	3845
1383	UUCUACA G GAGAGCUC	1649	GAGGUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UUGAUGA	3846
1398	UCCUCCAC G GAGAGU	1650	AACUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG GUGGAGA	3847
1399	CUUACAG G AAGUUC	1651	GAUCUUC GAGGAAACUCC GU UCAAGGACAUUGUCCGG CUUGAGG	3848
1401	UCCAGGA G AUGUUCG	1652	GGUACUU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UCCUGGA	3849
1414	UCCUUAU G GUUUGAG	1653	CAGAAAC GAGGAAACUCC GU UCAAGGACAUUGUCCGG AUUGAGA	3850
1421	UGUUAU G GUUGAG	1654	CUUUAAG GAGGAAACUCC GU UCAAGGACAUUGUCCGG AGAAACA	3851
1426	UUGUGUA G UAGAGAG	1655	CUUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UAGCGAG	3852
1427	GUUGUA G AGAGACG	1656	GUUGUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CUGGCG	3853
1429	GUUGUA G AGAGACG	1657	CAGUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UCCUGCC	3854
1437	GAGCAGU G GUUGUCU	1658	CAGCAGU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AGUUCU	3855
1445	GUUGUCU G GAGAGAG	1659	CUGUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AGCAGC	3856
1453	GUAGCA G GCACAC	1660	GUUGUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UGUUUC	3857
1466	CACCCU G GACAUUU	1661	AAUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AAGGUG	3858
1467	ACCCUUG G AGCAUUU	1662	AAUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CAGGUG	3859
1500	UACUUAU G GUUGAGU	1663	ACUCCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AUUGUA	3860
1501	ACUUAU G GUUGAGU	1664	AACUCCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AUUAGU	3861
1506	AUGGUGA G GUACAA	1665	UUGGUAU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UGACCU	3862
1556	AUACUUG G GCGAGUG	1666	CACUCCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG GCGAGU	3863
1563	CGGCGAGU G GAGAGU	1667	ACAUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG AGCGGCG	3864
1564	GCCAGAGU G AAGUGUG	1668	CACAUUCU GAGGAAACUCC GU UCAAGGACAUUGUCCGG CACGCG	3865
1567	CAGUGAA G AUUGGUC	1669	GCCACU GAGGAAACUCC GU UCAAGGACAUUGUCCGG UUCUUC	3866
1572	GAGAGU G GCGAGUC	1670	GAGUGUC GAGGAAACUCC GU UCAAGGACAUUGUCCGG ACAUUC	3867

Table 23

1585	CGUCCAA G AGCAUUG	1671	ACAGUCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUGGAGC	3868
1623	UCAUCCAC G GCAUCUG	1672	ACNGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GUUGAUG	3869
1624	CAUCCAC G GCAUCUG	1673	ACAGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CGUGAUG	3870
1635	ACUUAUAU G GAGUCUUG	1674	ACNGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUACAGU	3871
1636	CUUUAUUG G GAGUCUUG	1675	ACNGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUACAGU	3872
1637	UGUAUAUG G AGGUUA	1676	UACAGCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CCAUACA	3873
1650	GUUAUAU G GAGGUGU	1677	AGCCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUAUAAC	3874
1651	UAUAUAU G AGGUUUC	1678	GAAGCCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAUGAUA	3875
1653	AUAUAUG G GCUUUAU	1679	UAGAAGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UCUAUAU	3876
1654	UCAUAUG G GCUUUAU	1680	GUAGAAG GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUCAUAU	3877
1676	CUUUAUUG G GCUUUAU	1681	UUGGGCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GAUCAAG	3878
1677	UUUAUUG G GCUUUAU	1682	UUUGGGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GAUCAAA	3879
1693	AACGAUUG G GCUUUAU	1683	AGCAAAG GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUUUGUU	3880
1733	UGAUUAU G GACGGAG	1684	CUUGCCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGAUAUA	3881
1734	AGUUAUUG G ACGGAGC	1685	CGUGCCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGAUAUA	3882
1737	UUAGGAC G GCAUUGU	1686	ACGCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GUUCUAA	3883
1743	ACGGAGC G GUGAAGC	1687	GGGCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACUGUCC	3884
1746	CGAGGUG G GUGAAGC	1688	AGGACCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACCGUGC	3885
1747	CAGCGUG G AAGGCCU	1689	AAAGAGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUCACUG	3887
1750	CGUAUAU G GCUUUAU	1690	UCCAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AAGUGAC	3888
1767	GUUAUAU G GCAUAUA	1691	UUCAUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAUGUAU	3889
1768	UCAUUAU G AUAUAUA	1692	CAUUAUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUGUCAA	3890
1773	UUAUAUAU G GAUAUAU	1693	ACAGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAUUGCA	3891
1774	UUAUAUAU G AUAUAUA	1694	GCACUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUCUAUA	3892
1777	ACUUAUAU G ACUUAUA	1695	GUUGUAC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACAGUUA	3893
1783	AGACUAU G GUUAUAU	1696	UUAUAUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUGUAUA	3894
1800	AUUAUAU G AUAUAUA	1697	UGAUUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUUGUAU	3895
1804	CACUAUAU G AUGUAUA	1698	AUGUUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUGUAUA	3896
1839	UAUAUAU G GUUAUAU	1699	UUAUAUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUGUAUA	3897
1861	UGCCUAU G GUUAUAU	1700	UGUAUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUGUAUA	3898
1892	GUUAUAU G GGUUAUA	1701	UGGUAUA GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUAUAUA	3899
1960	UUAUAUAU G GAGUUAU	1702	AUGGUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUAUAUA	3900
1961	GAUAUAU G GAGUUAU	1703	CUUAUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUAUAUA	3901
1963	AGUAUAU G GCUUAUA	1704	CUUAUAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUAUAUA	3901

Table 23

1970	AGGACCAU G GCGAGAG	1705	CUUCUGCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGGCGCU	3902
1971	GCCCAU G GCGAGAG	1706	CUUCUGCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGGCGCU	3903
1975	CAUAGCA G AAGUAGA	1707	UUAUUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGCGCAUG	3904
1978	GGCAGAA G AAGUAGU	1708	AUUAUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGCGCAUG	3905
1982	AGAAGAAU G AGAUUCC	1709	GGAAUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUUGCC	3906
1984	AAGUAGA G AUUCCAC	1710	AGGGAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUAUUGU	3907
1993	AUUCUCCU G GACGAC	1711	GUGUGUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGGGAAU	3908
1994	UUUCCUUG G ACACACC	1712	GUGUGUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAGGGAA	3909
2008	ACUCCUUG G GUDACAU	1713	AAGUAAAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGGAGU	3910
2018	UUAUUAU G GUDACAG	1714	CUUGAAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AAGUGAA	3911
2029	CACAGUA G GAGACCA	1715	UUBUUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUUGU	3912
2030	ACUAGUG G AGACACG	1716	CUUGUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUAUUGU	3913
2032	AAGUAGA G ACACAGU	1717	AUCUGUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUUAUUA	3914
2038	GAGACAA G AUGGACC	1718	GUUGCAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UBUUGUC	3915
2041	ACACAGU G GCACUUA	1719	ACAGUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUAUUGU	3916
2050	GCACUUG G GCGAGAC	1720	GCUCUGC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACAGUUC	3917
2055	UGUGGCA G AGCACUC	1721	GAGUUGU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGGACCA	3918
2065	GCAUCCA G GACUCCU	1722	GGAGGUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAGUGUC	3919
2066	CACUACG G ACUUCUC	1723	GGAGGUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUGAGUG	3920
2101	GCUGUAU G GUGAGGA	1724	UCUUAUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUCAAGGC	3921
2102	CUUGUAU G AGAGGAA	1725	UUUUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAUACAG	3922
2104	UUGAGGA G AAGAGAA	1726	UUUUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAUACAA	3923
2107	AUGAGAA G GAAAGAA	1727	GUUUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUCUUA	3924
2108	UGAGAGG G AAGAGGC	1728	AGCUUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUCCA	3925
2113	AAGAGAA G GUGUGUA	1729	UUGCAGC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUAU	3926
2117	AAAGGCU G GCAAGUG	1730	CACUUUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCUUUU	3927
2122	GUUGCAA G GUGUGUC	1731	GAUCCAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUGGACG	3928
2125	GCGAGU G GAGUACG	1732	UUGAACG GGAGGAAACUCC CU UCAAGGACAUUCUCCGG ACUUGCC	3929
2126	GAGUGU G GUGCAGG	1733	CUUGAAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CACUUGC	3930
2133	GUUUCCA G GAGUGUA	1734	UUAUAUC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UGGAUCC	3931
2134	GUUCCAG G GACUUAU	1735	GUACAGU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUGAAAC	3932
2135	GUUCCAG G ACUGUAC	1736	GUUAUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUGAAC	3933
2148	UACUGUA G GAGACAG	1737	UCUUAUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UUAAGUA	3934
2149	ACUUGUG G AAGACAG	1738	UUUUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUACAGU	3935

Table 25

2155	AGGAAACA G AAGAGAGA	1739	UCUCUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UGUUUUU	3936
2160	ACAGAAA G AGAGAAA	1740	UUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3937
2162	AGAAAGA G AAGAGAGA	1741	UUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3938
2165	AAGAGAA G AAGAGAGC	1742	GUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3939
2169	AGAGAAA G AAGACUCC	1743	GAGUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3940
2182	ACUUGUCU G GCGGAAU	1744	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3941
2185	CUUGUCC G GGAUUAU	1745	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3942
2186	UCUGUGCC G GAAUUAU	1746	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3943
2187	GUUGUGCC G AAUUAU	1747	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3944
2197	AUAUUUU G GUUUAU	1748	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3945
2217	UUUUAU G GGAUUAU	1749	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3946
2218	UUAUUAU G GGAUUAU	1750	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3947
2219	UUAUUAU G AAGUUAU	1751	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3948
2311	UUAUUAU G AAGUUAU	1752	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3949
2319	GAUUAU G GCUUAU	1753	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3950
2332	CACAGCA G GUUUAU	1754	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3951
2341	GUUUAU G GCUUAU	1755	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3952
2356	GUUUAU G GUUUAU	1756	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3953
2364	GUUUAU G GCUUAU	1757	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3954
2368	CCUUAU G AAGAGAGA	1758	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3955
2370	CUGUUAU G AAGAGAGC	1759	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3956
2373	GCAGAGAA G AGACAGAG	1760	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3957
2375	AGAGAGAA G ACAGAGU	1761	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3958
2396	UCCUUAU G GCUUAU	1762	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3959
2410	AGUUAU G GAGAGAU	1763	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3960
2411	GUUUAU G AAGAGAGU	1764	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3961
2413	CAGUAGAA G AGAGAGAA	1765	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3962
2415	GUUUAU G GUUUAU	1766	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3963
2416	UAGAGAG G AGAGAGAG	1767	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3964
2441	UUUUUUU G AGAGAGAG	1768	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3965
2443	GUUUAU G AGAGAGAG	1769	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3966
2447	UAGAGAG G GAGUUAU	1770	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3967
2448	AGAGAGAG G GAGUUAU	1771	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3968
2449	GAGAGAG G AGUUAU	1772	AUUUUUU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUUUU	3969

Table 23

2473	CUAACAUI G GUICAAAG	1773	CUUUGCAC GGAGGAAACUCC CU UCAAGGACAUCCUCCGGG AAUGUUAG	3970
2481	GGUCAA G AUUGCUUC	1774	GAGGCAU GGAGGAAACUCC CU UCAAGGACAUCCUCCGGG UUUGCACC	3971
2511	AAAAACUA G AAAAATAA	1775	UUUUUUU GGAGGAAACUCC CU UCAAGGACAUCCUCCGGG UAGUUUUU	3972

Input Sequence = AF190725. Cut Site = G/.

Stem Length = 8. Core Sequence = GGAGGAAACUCC CU UCAAGGACAUCCUCCGGG

AF190725 (Homo sapiens beta-site APP cleaving enzyme (BACE) mRNA; 2526 bp)

Table 24

Table 24: Human Phospholamban (PLN) Hammerhead Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
16	AGAAACU C CCCAGCUA	1	UAGCUGGG CUGAUGAG X CGAA AGUUUUUCU	1137
24	CCCAGCU A AACACCGG	2	CGGUGUUU CUGAUGAG X CGAA AGCUGGGG	1138
34	ACACCCGU A AGACUUA	3	UGAAGUCU CUGAUGAG X CGAA ACGGGUGU	1139
40	GUAGAGU U CAUACAAC	4	GUUGUAUG CUGAUGAG X CGAA AGUCUUAC	1140
41	UAAGACUU C AUACAACA	5	UGUUGUAU CUGAUGAG X CGAA AAGUCUUA	1141
44	GACUUCAU A CAACACAA	6	UUGUGUUG CUGAUGAG X CGAA AUGAAGUC	1142
54	AACACAAU A CUCUAUAC	7	GUUAUGAG CUGAUGAG X CGAA AUUGUGUU	1143
57	ACAAUACU C UAUACUGU	8	ACAGUAUA CUGAUGAG X CGAA AGUAUUGU	1144
59	AAUACUCU A UACUGUGA	9	UCACAGUA CUGAUGAG X CGAA AGAGUAUU	1145
61	UACUCUAU A CUGUGAUG	10	CAUCACAG CUGAUGAG X CGAA AUAGAGUA	1146
72	GUGAUGAU C ACAGCUGC	11	GCAGCUGU CUGAUGAG X CGAA AUCAUCAC	1147
88	CCAAGGCU A CCUAAAAG	12	CUUUUAGG CUGAUGAG X CGAA AGCCUUGG	1148
92	GGCUACCU A AAGAAGA	13	UCUUCUUU CUGAUGAG X CGAA AGGUAGCC	1149
105	AAGACAGU U AUCUCAUA	14	UAUGAGAU CUGAUGAG X CGAA ACUGUCUU	1150
106	AGACAGUU A UCUCUAUU	15	AUAUGAGA CUGAUGAG X CGAA AACUGUCU	1151
108	ACAGUUUU C UCAUAUUU	16	AAAUUAUA CUGAUGAG X CGAA AUAAUCUU	1152
110	AGUUAUCU C AUUAUUGG	17	CCAAUAUU CUGAUGAG X CGAA AGAUUAACU	1153
113	UAUCUCAU A UUUGGUG	18	CAGCCAAA CUGAUGAG X CGAA AUGAGUAU	1154
115	UCUCAUUU U UGGUGGCC	19	GGCAGCCA CUGAUGAG X CGAA AUAUGAGA	1155
116	CUCAUAUU U GGCUGCCA	20	UGGCAGCC CUGAUGAG X CGAA AAUAUGAG	1156
128	UGCCAGCU U UUAUUCUU	21	AAGAUAAA CUGAUGAG X CGAA AGCUGGCA	1157
129	GCCAGCUU U UUAUCUUU	22	AAAGAUAA CUGAUGAG X CGAA AAGCUGGC	1158
130	CCAGCUUU U UAUCUUUC	23	GAAAGUAU CUGAUGAG X CGAA AAGCUGGG	1159
131	CAGCUUUU U AUCUUUCU	24	AGAAAGAU CUGAUGAG X CGAA AAAAGCUG	1160
132	AGCUUUUU C UCUCUCUC	25	GAGAAAGA CUGAUGAG X CGAA AAAAGCUC	1161
134	CUUUUUUU C UUUUCUCUC	26	GAGAGAAA CUGAUGAG X CGAA AUAAAAAG	1162
136	UUUUUAUU U UCUCUGCA	27	UCGAGAGA CUGAUGAG X CGAA AGAUAAAA	1163
137	UUUAUCUU U CUCUGCAC	28	GUCGAGAG CUGAUGAG X CGAA AAGAUAAA	1164
138	UUUAUCUU C UCUCGACC	29	GGUCGAGA CUGAUGAG X CGAA AAAGUAAA	1165
140	AUCUUUCU C UCGACAC	30	GUGGUGCA CUGAUGAG X CGAA AGAAAGAU	1166
142	CUUCUCUC C GACCAUUU	31	AAGUGGUC CUGAUGAG X CGAA AGAGAAAG	1167
150	CGACCAUU U AAACUUC	32	GAAGUUUU CUGAUGAG X CGAA AGUUGUCG	1168
151	GACCAUUU A AAACUUA	33	UGAAGUUU CUGAUGAG X CGAA AAGUGGUC	1169
157	UUAAAACU U CAGACUUA	34	GAAAGUCU CUGAUGAG X CGAA AGUUUUAA	1170
158	UAAAACUU C AGACUUC	35	GGAGUCU CUGAUGAG X CGAA AAGUUUUA	1171
164	UUCAGACU U CCUGUCUU	36	AGGACAGG CUGAUGAG X CGAA AGUCUGAA	1172
165	UCAGACUU C CUGUCUGU	37	CAGGACAG CUGAUGAG X CGAA AAGUCUGA	1173
170	CUUCUCUU C CUGCUGGU	38	ACCAGCAG CUGAUGAG X CGAA ACAGGAGG	1174
179	CUGCUGGU A UUGAGGAG	39	CUCCAUGA CUGAUGAG X CGAA ACCAGCAG	1175
181	CGUGGUUU C AUGAGAA	40	UUCUCCAU CUGAUGAG X CGAA AUACCAAG	1176
193	GAGAAAGU C CAUUAACU	41	AGGUUAUG CUGAUGAG X CGAA ACUUUCUC	1177
198	AGUCCAUA A CCUCACUC	42	GAGUGAGG CUGAUGAG X CGAA AUUGGACU	1178

Table 24

202	CAAUACCU C ACUCGCU	43	GAGCGAGU CUGAUGAG	X	CGAA AGGUUAUG	1179
206	ACCUCACU C GCUCAGCU	44	AGCUGAGC CUGAUGAG	X	CGAA AGUGAGGU	1180
210	CACUCGCU C AGCUAUAA	45	UUAUAGCU CUGAUGAG	X	CGAA AGCGAGUG	1181
215	GCUCAGCU A UAAAGAGA	46	UCUCUUAU CUGAUGAG	X	CGAA AGCUGAGC	1182
217	UCAGCUAU A AGAAGAGC	47	GCUCUUCU CUGAUGAG	X	CGAA AUAGCUGA	1183
228	AAGAGCCU C AACCAUUG	48	CAUUGGUU CUGAUGAG	X	CGAA AGGCUCUU	1184
235	UAAACCAU U GAUAAGCC	49	GGCAUUCU CUGAUGAG	X	CGAA AUGGUGUA	1185
245	AAAUGCCU C AACAGAGA	50	UGCUUUGU CUGAUGAG	X	CGAA AGGCAUUU	1186
257	AAGCAGCU C AAAAGCUA	51	UAGCUUUU CUGAUGAG	X	CGAA ACGUGCUU	1187
265	CAAAAGCU A CAGAAUCU	52	AGAUCUGU CUGAUGAG	X	CGAA AGCUUUUG	1188
272	UACAGAAU C UAUUUUUC	53	GAUAAUAU CUGAUGAG	X	CGAA AUUCUGUA	1189
274	CAGAAUCU A UUUUAUAA	54	UUGAUAAA CUGAUGAG	X	CGAA AGAUUCUG	1190
276	GAUUCUAA U UAUCAAUU	55	AAUUGAUA CUGAUGAG	X	CGAA AUAGAUUC	1191
277	AAUCUAUU U AUCAAUUU	56	AAAUUGAU CUGAUGAG	X	CGAA AAUAGAUU	1192
278	AUCUAUUU A UCAUUUUC	57	GAUAUUGA CUGAUGAG	X	CGAA AAUAGAUU	1193
280	CUAUUUUU C AAUUUCUG	58	CAGAAAUU CUGAUGAG	X	CGAA AUAAUUGU	1194
284	UUAUCAAU U UCUGUCUA	59	GAGACAGA CUGAUGAG	X	CGAA AUUGAUAA	1195
285	UAUCAAUU U CUUGUCUA	60	UGAGACAG CUGAUGAG	X	CGAA AAUUGAUA	1196
286	AUCAAUUU C UGUUCUAU	61	AUGAGACA CUGAUGAG	X	CGAA AAUUGAUA	1197
290	AUUUCUGU C UCAUCUUA	62	UAAAGAGA CUGAUGAG	X	CGAA ACAGAAAU	1198
292	UUCUGUCU C AUUUUAUU	63	AUUAAGAU CUGAUGAG	X	CGAA AGACAGAA	1199
295	UGUCUCAU C UUAUAUUG	64	CAUAUUAU CUGAUGAG	X	CGAA AUGAGACA	1200
297	UCUCAUUC U AAUAUGUC	65	GACAUUUU CUGAUGAG	X	CGAA AGAUGAGA	1201
298	CUCAUUCU A AUAGUCUU	66	AGACAUAU CUGAUGAG	X	CGAA AAGAGAGU	1202
301	AUCUUAUU A UGUUCUUC	67	AAGAGACA CUGAUGAG	X	CGAA AUUAAGAU	1203
305	UAUAUUGU C UCUCUGUG	68	CAGCAAGA CUGAUGAG	X	CGAA ACAUAUUA	1204
307	AUAUGUCU C UUGUCUGU	69	AUACGAAU CUGAUGAG	X	CGAA AGACAUAU	1205
309	AUGUCUCU U GCUGAUUU	70	AGAUCAUC CUGAUGAG	X	CGAA AGAGACAU	1206
316	UUGUCUGU C UGUUAUUA	71	AUGAUACA CUGAUGAG	X	CGAA AUCAGCAA	1207
320	UGAUCUGU A UCAUCUGU	72	CACGAUGA CUGAUGAG	X	CGAA ACAGAUCA	1208
322	AUCUGUAU C AUCUGUAU	73	AUCAAGAU CUGAUGAG	X	CGAA AUACAGUA	1209
325	UGUAUUAU C UGAUGUCU	74	AGCAUACU CUGAUGAG	X	CGAA AUGAUACA	1210
334	GUGAUGCU U CUCUGAAG	75	CUUCAGAG CUGAUGAG	X	CGAA AGCAUACU	1211
335	UGAUGCUU C UCUGAUAU	76	ACUUCAGA CUGAUGAG	X	CGAA AAGCAUUA	1212
337	AUGCUUCU C UGAUGUUC	77	GAACUUAU CUGAUGAG	X	CGAA AGAAGCAU	1213
344	UCUGAAGU U CUGCUACA	78	UGUAGCAG CUGAUGAG	X	CGAA ACUUCAGA	1214
345	CUGAAGUU C UGUAACAA	79	UUGUAGCA CUGAUGAG	X	CGAA AAGCUUAG	1215
350	GUUCUGCU A CAACCCUU	80	AGAGGUUG CUGAUGAG	X	CGAA AGCAGAAC	1216
357	UACAACCU C UAGAUCUG	81	CAGAUUAU CUGAUGAG	X	CGAA AGGUUGUA	1217
359	CAACCCUU A GAUCUGCA	82	UGCAUAUC CUGAUGAG	X	CGAA AGAGUUGU	1218
363	CUCUAGAU C UGCAGUUC	83	AAGCUGCA CUGAUGAG	X	CGAA AUCUAGAG	1219
371	CUGCAGCU U GCCACAUC	84	GAUGUGGC CUGAUGAG	X	CGAA AGCUGCAG	1220
379	UGCCACAU C AGCUUAAA	85	UUUAAGCU CUGAUGAG	X	CGAA AUGUGGCA	1221
384	CAUCAGCU U AAAUUCUG	86	CAGAUUUU CUGAUGAG	X	CGAA AGCUGAUG	1222
385	AUCAGCUU A AAUUCUGU	87	ACAGAUUU CUGAUGAG	X	CGAA AAGCUGAU	1223
390	CUUAAAUA C UGUCAUCC	88	GGAUGACA CUGAUGAG	X	CGAA AUUUUAAG	1224
394	AAAUUCUG C AUCCCAUG	89	CAUGGGAU CUGAUGAG	X	CGAA ACAGAUUU	1225

Table 24

397	UCUGUCAU C CCAUGCAG	90	CUGCAUGG CUGAUGAG X CGAA AUGCAGA	1226
419	AAACAAU A UUGUAUA	91	UUAUACAA CUGAUGAG X CGAA AUGUUUU	1227
421	AACAAU A UGUUAACA	92	UGUUAUAC CUGAUGAG X CGAA AUUAUGUU	1228
424	AAUAUGU A UAACAGAC	93	GUCUGUUA CUGAUGAG X CGAA ACAUUAU	1229
426	UAUUGUAU A ACAGACCA	94	UGGUCUGU CUGAUGAG X CGAA AUACAAU	1230
437	AGACCACU U CCUGAGUA	95	UACUCAGG CUGAUGAG X CGAA AGUGGUCU	1231
438	GACCACU C CUGAGUAG	96	CUACUCAG CUGAUGAG X CGAA AAGUGGUC	1232
445	UCCUGAGU C GAAGAGU	97	AAUCUCUC CUGAUGAG X CGAA ACUCAGGA	1233
453	AGAAGAGU U UCUUGUG	98	CACAAAGA CUGAUGAG X CGAA ACUCUCUC	1234
454	GAGAGAGU U CUUUGUGA	99	UCACAAAG CUGAUGAG X CGAA AACUCUCU	1235
455	AAAGAGUU C UUUGUGAA	100	UUACAA CUGAUGAG X CGAA AAACUCU	1236
457	GAGUUUCU U UGUGAAAA	101	UUUUCACA CUGAUGAG X CGAA AGAAACUC	1237
458	AGUUUCUU U GUGAAAA	102	CUUUUCAC CUGAUGAG X CGAA AAGAAACU	1238
469	GAAGAGUU C AAGUAUA	103	UUAUUCU CUGAUGAG X CGAA AACUUUC	1239
475	GUCAAGAU U AAGACUA	104	UUAGUCUU CUGAUGAG X CGAA AUUCUAG	1240
476	UCAGAUAU A AGACUAAA	105	UUUAGUCU CUGAUGAG X CGAA AUUCUAGA	1241
482	UAAGACU A AAACUUA	106	AUAAGUUU CUGAUGAG X CGAA AGUCUUA	1242
488	CUAAACU U AUUGUUA	107	GUAAACAU CUGAUGAG X CGAA AGUUUUA	1243
489	UAAACUU A UUGUUAAC	108	GGUAAACA CUGAUGAG X CGAA AAGUUUA	1244
491	AUAUCUUA U UUAACAU	109	AUGGUAAC CUGAUGAG X CGAA AUAAGUU	1245
494	CUUAUGU U ACCAUUG	110	CAUAUGGU CUGAUGAG X CGAA ACAUAUAG	1246
495	UUUAUGU A CCAUAUG	111	ACAUAUGG CUGAUGAG X CGAA AACAAUA	1247
500	GUUACCAU A UGUUAUCA	112	UGAAUACA CUGAUGAG X CGAA AUGGUUAC	1248
504	CCAUAUGU A UUCAUCUG	113	CAGAUGAA CUGAUGAG X CGAA ACUAUUG	1249
506	AUAUGUAU U CAUCUGU	114	AACAGAUG CUGAUGAG X CGAA AUACUAU	1250
507	UAUGUAU C AUCUGUUG	115	CAACAGU CUGAUGAG X CGAA AAUACAUA	1251
510	GUUAUCAU C UGUUGGAU	116	AUCCAACA CUGAUGAG X CGAA AUGAAUAC	1252
514	UCAUCUGU U GGAUCUG	117	CAGAUAUC CUGAUGAG X CGAA ACAGAUGA	1253
519	UGUUGGAU C UGUUAAC	118	GUUUAACA CUGAUGAG X CGAA AUCCAACA	1254
521	UGGAUUCU U GUAAACAU	119	AUGUUUAC CUGAUGAG X CGAA AGAUCCA	1255
524	GAUCUUGU A AACUGAA	120	UUAUGUU CUGAUGAG X CGAA ACAAGUAC	1256
540	AAAGGUCU U UAUUUUA	121	UGAAUAUA CUGAUGAG X CGAA AGCCUUU	1257
541	AAGGUCU U AUUUUCAA	122	UGAAUAUA CUGAUGAG X CGAA AAGCCUU	1258
542	AGGUCUU A UUUCRAA	123	UUUGAAUA CUGAUGAG X CGAA AAGCCUU	1259
544	GGCUUUAU U UUCAAAAA	124	UUUUUGAA CUGAUGAG X CGAA AUAAAGCC	1260
545	GCUUUAU U UCAAAAAU	125	AUUUUUGA CUGAUGAG X CGAA AUUAAAGC	1261
546	CUUAUUAU U CAAAAAU	126	AUUUUUUG CUGAUGAG X CGAA AUUUUAG	1262
547	UUUAUUUU C AAAAAUA	127	UAUUUUUU CUGAUGAG X CGAA AAAUAUA	1263
554	UCAAAAAU U AACUUCAA	128	UUGAAGUU CUGAUGAG X CGAA AUUUUUA	1264
555	CNAAAAAU A ACUCRAA	129	UUUGAAGU CUGAUGAG X CGAA AUUUUUUG	1265
559	AUUUAACU U CAAAUUA	130	UUUUUUUG CUGAUGAG X CGAA AGUUAAU	1266
560	AUUAACUU C AAAUAAG	131	CUUAUUUU CUGAUGAG X CGAA AAGUUAU	1267
566	UUCAAAAU A AGUGUAUA	132	UAUAACU CUGAUGAG X CGAA AUUUUGAA	1268
572	AUAAGUGU A UAAAUAGC	133	GCAUUUUA CUGAUGAG X CGAA ACACUUU	1269
574	AAGUGUAU A AAUUGCAA	134	UUUCAUUU CUGAUGAG X CGAA AUACACUU	1270
587	GCAACUUG U GAUUUCCU	135	AGGAAUUC CUGAUGAG X CGAA ACAGUUGC	1271
591	CUGUGUAU U UCCUCAAC	136	GUUGAGGA CUGAUGAG X CGAA AUCAACAG	1272

Table 24

592	UGUUGAUU U CCUCAACA	137	UGUUGAGG CUGAUGAG X CGAA AAUCAACA	1273
593	GUUGAUUU C CUCACAACU	138	AUGUUGAG CUGAUGAG X CGAA AAAUCAAC	1274
596	GAUUUUUU C AACAUUGC	139	GCCAUGUU CUGAUGAG X CGAA AGGAAAUU	1275
606	ACAUGGCU C ACAAUUUU	140	AAAUUUUU CUGAUGAG X CGAA AGCCAUGU	1276
613	UCACAAU U UCUAUCCC	141	GGAUAGA CUGAUGAG X CGAA AUUUUGUA	1277
614	CACAAUUU U CUUACCCA	142	UGGGAUAG CUGAUGAG X CGAA AAUUGUGU	1278
615	ACAAAUUU C UAUCACAA	143	UUGGGAUA CUGAUGAG X CGAA AAUUUUUU	1279
617	AAUUUUUU C UCCCAAAU	144	AUUUGGGA CUGAUGAG X CGAA AGAAUUUU	1280
619	AUUUCUUA C CCAAAUCU	145	AGAUUUGG CUGAUGAG X CGAA AUAGAAAU	1281
626	UCCCAAAU C UUUUCUGA	146	UCAGAAAA CUGAUGAG X CGAA AUUUUGGA	1282
628	CCAAAUUU C UUCUGAAG	147	CUUCAGAA CUGAUGAG X CGAA AGAUUUUG	1283
629	CAAAUUUU U UCUGAAGA	148	UCUUCAGA CUGAUGAG X CGAA AAGAUUUG	1284
630	AAAUUUUU U CUGAAGAU	149	AUCUUCAG CUGAUGAG X CGAA AAAGAUUU	1285
631	AAUCUUUU C UGAAGAUU	150	CAUCUUCA CUGAUGAG X CGAA AAAAGAUU	1286
646	UAAGAGU U UAUGUUUA	151	UAAAACUA CUGAUGAG X CGAA ACUCUCCA	1287
647	GAAGAAUU U AGUUUUAA	152	UAAAACUU CUGAUGAG X CGAA AACUCUUC	1288
648	GAAGAUUU A GUUUUAAA	153	UUUAAAAC CUGAUGAG X CGAA AACUCUUC	1289
651	AGUUUAGU U UUUAAAACU	154	AGUUUUAA CUGAUGAG X CGAA ACUAAAACU	1290
652	GUUUAGUU U UAAAACUG	155	CAGUUUUU CUGAUGAG X CGAA AACUAAAAC	1291
653	UUUAGUUU U AUAACUGC	156	GCAGUUUU CUGAUGAG X CGAA AAACUAAA	1292
654	UAAGUUUU A AAACUGCA	157	UGCAGUUU CUGAUGAG X CGAA AAAACUAA	1293
675	CAACAAGU U CACUUCAU	158	AUGAAGUG CUGAUGAG X CGAA ACUUUGUG	1294
676	AAACAAGU C ACUCUAUA	159	UAUGAAGU CUGAUGAG X CGAA AACUUGUU	1295
680	AGUUCACU U CAUAUAUA	160	UAUAUAUG CUGAUGAG X CGAA AGUGAACU	1296
681	GUUCACUU C AUUAUAUA	161	UAUAUAUU CUGAUGAG X CGAA AAGUGAAC	1297
684	CACUUCAU A UAUAAGC	162	GCUUUAUA CUGAUGAG X CGAA AUGAAGUG	1298
686	CUUCAUAU A UAAGACAU	163	AUGC UUUA CUGAUGAG X CGAA AUUAUGAG	1299
688	UCAUAUAU A AAGCAUUA	164	UAUUGCUU CUGAUGAG X CGAA AUUAUGA	1300
695	UAAGACAU U AUUUUUAC	165	GUAAAAUU CUGAUGAG X CGAA AUGCUUUA	1301
696	AAAGCAUU A UUUUUACU	166	AGUAAAAU CUGAUGAG X CGAA AAUUCUUU	1302
698	AGCAUAUU U UUUUACUU	167	AGAGUAAA CUGAUGAG X CGAA AUAAUUCU	1303
699	GCUAUAUU U UUAUCUUU	168	AAGAGUAA CUGAUGAG X CGAA AUUAUUGC	1304
700	CAUAUAUU U UAUCUUUU	169	AAAGAGUA CUGAUGAG X CGAA AAUAUAGU	1305
701	AUAUAUUU U ACUCUUUU	170	AAAGAGU CUGAUGAG X CGAA AAAUAUUU	1306
702	UAUUUUUU A CUUUUUUG	171	CAAAAGAG CUGAUGAG X CGAA AAAAAUAA	1307
705	UUUUUACU C UUUUUGAG	172	CCUCAAAA CUGAUGAG X CGAA AGUAAAAA	1308
707	UUUAUCUU U UGAGGUG	173	CACCUCAA CUGAUGAG X CGAA AGAGUAAA	1309
708	UAUCUCUU U UGAGGUGA	174	UCACCUCA CUGAUGAG X CGAA AAGAGUAA	1310
709	UAUCUUUU U GAGGUGAA	175	UUCACCUU CUGAUGAG X CGAA AAGAGUAA	1311
719	AGGUGAAU U UAUAUAUA	176	AUAUAUAU CUGAUGAG X CGAA AUUCACCU	1312
721	GUGAAUAU A AUUAUAUA	177	AUAUAUAU CUGAUGAG X CGAA AUUAUCAC	1313
724	AAUAUAUA U UAUAUAUA	178	GUAAUAUA CUGAUGAG X CGAA AUUAUAUA	1314
725	AUAUAUAU U UAUAUAUA	179	UGUAUAUA CUGAUGAG X CGAA AUUAUAUA	1315
726	UAUAUAUA U UAUAUAUA	180	UUGUAUAU CUGAUGAG X CGAA AAUAUAUA	1316
728	AUAUAUAU A UAUAUAUA	181	CAUAUAUA CUGAUGAG X CGAA AUAAAAUA	1317
730	UAUAUAUA U ACAUAUGA	182	UAUAUAUA CUGAUGAG X CGAA AUUAUAUA	1318
731	UUUAUAUA A CAUAUGAA	183	UUUAUAUA CUGAUGAG X CGAA AAUAUAUA	1319

Table 24

738	UACAAUGU A AAAGCUUC	184	GAAGCUUU CUGAUGAG X CGAA ACAUUGUA	1320
745	UAAAAGCU U CUUUAUA	185	UAUUAAG CUGAUGAG X CGAA AGCUUUUA	1321
746	AAAAGCUU C UUUAAUAC	186	GUUUUAAA CUGAUGAG X CGAA AAGCUUUU	1322
748	AAAGCUUU U UAAUACUA	187	UAGUAUUA CUGAUGAG X CGAA AGAAGCUU	1323
749	AGCUUCUU U AAUACUAA	188	UUAGUAUU CUGAUGAG X CGAA AAGAAGCU	1324
750	GCUCUUUU A AUACUAA	189	CUUAGUAU CUGAUGAG X CGAA AAGAAGC	1325
753	UCUUUAUU A CUAAGUAU	190	AUACUUAU CUGAUGAG X CGAA AUUAAGAA	1326
756	UUAUAUCU A AGUAUUUU	191	AAAUAUCU CUGAUGAG X CGAA AGUAUUUA	1327
760	UACUAAU A UUUUUCAG	192	CUGAAAAA CUGAUGAG X CGAA ACUUAUGA	1328
762	CUAAGUAU U UUUUCAGU	193	ACCUGAAA CUGAUGAG X CGAA AUACUUA	1329
763	UAAGUAUU U UUCAGGUC	194	GACCUGAA CUGAUGAG X CGAA AUUAUUUA	1330
764	AAGUAUUU U UCAGGUCU	195	AGACCUGA CUGAUGAG X CGAA AAUAUCU	1331
765	AGUAUUUU U CAGGUCUU	196	AAGACCUU CUGAUGAG X CGAA AAAUAUCU	1332
766	GUUUUUUU C AGGUCUUC	197	GAAACCUU CUGAUGAG X CGAA AAAUAUAC	1333
771	UUUCAGGU C UUCACCAA	198	UUGUGUAA CUGAUGAG X CGAA ACCUGAAA	1334
773	UCAGGUCU U CACCAAGU	199	ACUUGUGU CUGAUGAG X CGAA AGACCUUA	1335
774	CAGGUCUU C ACCAAGUU	200	UACUUGGU CUGAUGAG X CGAA AAGACCUU	1336
782	CACCAAGU A UCACAAUA	201	UACUUUGA CUGAUGAG X CGAA ACUUGUGU	1337
784	CCAAGUAU C AAGUAUA	202	AUUAUUUU CUGAUGAG X CGAA AUACUUGG	1338
790	UAACAAAGU A AUACACAA	203	UGUGUUUU CUGAUGAG X CGAA ACUUGUAU	1339
793	AAAGUAUU A ACACAAAU	204	AUUUGUGU CUGAUGAG X CGAA AUUAUUUU	1340
809	UGAAGUGU C AUUAUUA	205	UGAAUUAU CUGAUGAG X CGAA ACACUUUA	1341
812	AGUGUCAU U AUUCAAAA	206	UUUUGAAU CUGAUGAG X CGAA AUGACACU	1342
813	GUGUCAUU A UUCAAAAU	207	AUUUUGAA CUGAUGAG X CGAA AUUGACAC	1343
815	GUCAUUUU U CAAAUAAG	208	CUAUUUUG CUGAUGAG X CGAA AUUAUGAC	1344
816	UCAUUUUU C AAAUAAGU	209	ACUAUUUU CUGAUGAG X CGAA AUUAUUGA	1345
822	UUCAAAAU A GUCCACUG	210	CAGUGGAC CUGAUGAG X CGAA AUUUUGAA	1346
825	AAAUAUGU C CACUGACU	211	AGUCAGUG CUGAUGAG X CGAA ACUAUUUU	1347
834	CACUGACU C CUCAUAUC	212	GAUGUGAG CUGAUGAG X CGAA AGUCAGUG	1348
837	UGACUCCU C ACAUCUGU	213	ACAGAUGU CUGAUGAG X CGAA AGGACUCA	1349
842	CGUCACAU C UGUUAUCU	214	AGAUUAUA CUGAUGAG X CGAA AUGUGAGG	1350
846	ACAUCUGU U AUUUUAUU	215	AUAUAAGU CUGAUGAG X CGAA ACAGAUGU	1351
847	CAUCUGUU A UCUUUAUA	216	UAUAAGA CUGAUGAG X CGAA AACAGAUG	1352
849	UCUGUUUU C UUAUUUAU	217	UAUAUAUA CUGAUGAG X CGAA AUAAACAGA	1353
851	UGUUUAUU U AUUAUUA	218	UUUAUAUA CUGAUGAG X CGAA AGUAUAUA	1354
852	GUUAUCUU A UUAUAAG	219	CUUUAUA CUGAUGAG X CGAA AAGAUAAC	1355
854	UAUCUUUU U AUAAAGAA	220	UUUUUUUU CUGAUGAG X CGAA AUAAAGUA	1356
855	AUCUUUAU A UAAAGAAC	221	GUUUUUUA CUGAUGAG X CGAA AUUAAGAU	1357
857	CUUAUUUU A AAGAACUA	222	UAGUUUUU CUGAUGAG X CGAA AUUAUAG	1358
865	AAAGAACU A UUUUGAGU	223	ACUACAAA CUGAUGAG X CGAA AGUUCUUU	1359
867	AGAACUAU U UGUAGUAA	224	UAUCUACA CUGAUGAG X CGAA AUAGUUUC	1360
868	GAAUUUUU U UUAUAAC	225	GUUAUUA CUGAUGAG X CGAA AUUAUUUC	1361
871	CUUUUUUU A GUAAUUUA	226	AUAGUUAC CUGAUGAG X CGAA ACAAUUAG	1362
874	UUUUUUUU A ACUAUCAG	227	CUUAUUA CUGAUGAG X CGAA ACUACAAA	1363
878	UUAUAACU A UCAGAAUC	228	GAUUCUGA CUGAUGAG X CGAA AGUUAUA	1364
880	GUAAUUUU C AGAAUCUA	229	UAGAUUUC CUGAUGAG X CGAA AUAGUUAC	1365
886	AUCAGAAU C UACAUUCU	230	AGAAUUGA CUGAUGAG X CGAA AUUCUGAU	1366

Table 24

888	CAGAAUCU A CAUUCUAA	231	UUAGAAUG CUGAUGAG X CGAA AGAUUCUG	1367
892	AUCUACAU U CUAAAAA	232	UGUUUUG CUGAUGAG X CGAA AUGUAGAU	1368
893	UCUACAUU C UAAACAG	233	CUGUUUUA CUGAUGAG X CGAA AAUGUAGA	1369
895	UACAUUCU A AAACAGAA	234	UUCUGUUU CUGAUGAG X CGAA AGAUUGUA	1370
906	ACAGAAAU U GUUUUUU	235	AAAAAUAC CUGAUGAG X CGAA AUUUCUGU	1371
909	GAAUUGU A UUUUUUCU	236	AGAAAAA CUGAUGAG X CGAA ACAUUUUC	1372
911	AAUUGUUA U UUUUCUUA	237	AUAGAAAA CUGAUGAG X CGAA AUACAAUU	1373
912	AUUGUAUU U UUUUCUAG	238	CAUAGAAA CUGAUGAG X CGAA AUUACAAU	1374
913	UUUAUUUU U UUCUAGUC	239	GCAUAGAA CUGAUGAG X CGAA AAUACAA	1375
914	UGUAUUUU U UCUAUGCC	240	GGCAUAGA CUGAUGAG X CGAA AAAAUACA	1376
915	GUUUUUUU U CUUAGCCA	241	UGGCAUAG CUGAUGAG X CGAA AUGUGGCA	1377
916	UAUUUUUU C UAUGCCAC	242	GUUGCAUA CUGAUGAG X CGAA AAAAAUA	1378
918	UUUUUUUU A UGCCACAU	243	AUGUGGCA CUGAUGAG X CGAA AGAAAAA	1379
927	UGCCACAU U AACAUUUU	244	AAGAUGUU CUGAUGAG X CGAA AUGUGGCA	1380
928	GCCACAUU A ACAUCUUU	245	AAAGAUGU CUGAUGAG X CGAA AUUGUGGC	1381
933	AUUAACAU C UUUUAAAG	246	CUUUAAAA CUGAUGAG X CGAA AUGUUAAU	1382
935	UAACAUUU U UUAAGAUU	247	AACUUUAA CUGAUGAG X CGAA AGAUUGUA	1383
936	AACAUUUU U AAAGUUGU	248	CAACUUUA CUGAUGAG X CGAA AAGAUGUU	1384
937	ACAUUUUU U AAAUGUA	249	UCAACUUU CUGAUGAG X CGAA AAAGAUUG	1385
938	CAUCUUUU A AAGUUGAU	250	AUCAACUU CUGAUGAG X CGAA AAAAGAUU	1386
943	UUUAAAGU U GAUGAGAA	251	UUCUCAUC CUGAUGAG X CGAA ACUUUAAA	1387
953	UAAGAGAU A CUCUUACA	252	CCAUACUU CUGAUGAG X CGAA AUUCUCAU	1388
958	AAUCAAGU A UGGAAGAG	253	CUUUUCCA CUGAUGAG X CGAA ACUUGAUU	1389
968	GGAAAGAU A AGGCCAUA	254	UAUGGCCU CUGAUGAG X CGAA ACUUUUCC	1390
976	AAGGCCAU A CUCUUACA	255	UGUAAGAG CUGAUGAG X CGAA AUGGCCUU	1391
979	GCCAUACU C UUAUAUAA	256	UUAUGUAA CUGAUGAG X CGAA AGUAUGGC	1392
981	CAUACUCU U ACAUAUUA	257	UAUUAUGU CUGAUGAG X CGAA AGAGUAUG	1393
982	AUAUCUCU A CAUAUAUA	258	UUAUUAUG CUGAUGAG X CGAA AAGAGUAU	1394
986	UCUUAACU A AUAAAUUU	259	AAUUAUUU CUGAUGAG X CGAA AUGUAAGA	1395
989	UACAUAUU A AAUUUCUU	260	AGGAUUUU CUGAUGAG X CGAA AUUAUUGA	1396
994	AAUAAAAU U CCUUUUAA	261	UUA AAAAG CUGAUGAG X CGAA AUUUUAUU	1397
995	AUAAAAUU C CUUUUAA	262	CUUAAAAG CUGAUGAG X CGAA AUUUUUUU	1398
998	AAAUUCUU U UUAAGUAA	263	UUACUUAA CUGAUGAG X CGAA AGGAUUUU	1399
999	AAUUCUUU U UAAGUAAU	264	AUUACUUA CUGAUGAG X CGAA AAGGAUUU	1400
1000	AUUCUUUU U AAGUAUUU	265	AAUUAUUU CUGAUGAG X CGAA AAAGGAUU	1401
1001	UUCUUUUU A AGUAUUUU	266	AAUUAUUU CUGAUGAG X CGAA AAAGGAUU	1402
1005	UUUUAAGU A AUUUUUUC	267	GAUAAAAU CUGAUGAG X CGAA ACUUAAAA	1403
1008	UAAGUAUU U UUUUCAAA	268	UUUGAAAA CUGAUGAG X CGAA AUUAUUUA	1404
1009	AAAGUAUU U UUUCAAAG	269	CUUUGAAA CUGAUGAG X CGAA AUUUAUUU	1405
1010	AGUAUUUU U UUCAAGAA	270	UCUUUGAA CUGAUGAG X CGAA AAUUAUUU	1406
1011	GUAAUUUU U UCAAGAAA	271	UUCUUUGA CUGAUGAG X CGAA AAUUAUUU	1407
1012	UAAUUUUU U CAAAGAAU	272	AUUUUUUA CUGAUGAG X CGAA AAAAAUUA	1408
1013	AAUUUUUU C AAAGAAUC	273	GAUUUUUU CUGAUGAG X CGAA AAAAAUUA	1409
1021	CMAAGAAU C ACAGAAUU	274	AAUUCUGU CUGAUGAG X CGAA AUUCUUUG	1410
1029	CAAGAGAU U CUAGUAUU	275	UGUACUAG CUGAUGAG X CGAA AUUCUUUG	1411
1030	ACAGAAUU C UAGUACAU	276	AUGUACUA CUGAUGAG X CGAA AAUUCUUU	1412
1032	AGAAUUUU A GUACAUUU	277	ACAUGUAC CUGAUGAG X CGAA AGAAUUUU	1413

Table 24

1035	AUUCUAGU	A CAUGUAGG	278	CCUACAUG	CUGAUGAG	X CGAA	ACUAGAAU	1414
1041	GUACAUGU	A GGUAAUUC	279	GAUUUACC	CUGAUGAG	X CGAA	ACAUUAGC	1415
1045	AUGUAGGU	A AAUCAUAA	280	UUUAUGAU	CUGAUGAG	X CGAA	ACCUACAU	1416
1049	AGGUAAAU	C AUAAAUUCU	281	AGAUUUUU	CUGAUGAG	X CGAA	AUUUACCU	1417
1052	UAAAUCAU	A AAUCUGUU	282	AAACAGAU	CUGAUGAG	X CGAA	UGAUUUUA	1418
1056	UCAUAAAU	C UGUUCUAA	283	UUAGAACA	CUGAUGAG	X CGAA	AUUUUAUA	1419
1060	AAAUUCU	U CUAAAGACA	284	UGUCUUAG	CUGAUGAG	X CGAA	ACAGAUUU	1420
1061	AAUCUGUU	C UAAGACAU	285	AUUCUUAU	CUGAUGAG	X CGAA	AACAGAUU	1421
1063	UCUGUUUC	A AGACAUUU	286	AUAUGUCU	CUGAUGAG	X CGAA	AGAAACAGA	1422
1070	UAAGACAU	A UGAUCAAC	287	GUUGAUCA	CUGAUGAG	X CGAA	AUGUCUUA	1423
1075	CAUAUGAU	C AACCAUUG	288	CAUCUGUU	CUGAUGAG	X CGAA	AUCAUUAU	1424
1096	CUGUGUGU	U AAUAUGUG	289	CACAUUUU	CUGAUGAG	X CGAA	ACCAACAG	1425
1097	UGUGUGUU	A AUUAUGUA	290	UCACAUUU	CUGAUGAG	X CGAA	AACCACCA	1426
1100	UGGUAAAU	C UAAGACAG	291	CUGUCACA	CUGAUGAG	X CGAA	AUUAUACA	1427
1115	AGUAGAUU	U AGUCAUUU	292	AUAUGACU	CUGAUGAG	X CGAA	AUUCUACU	1428
1116	GUGAGAUU	A GUCAUUAU	293	GAUAUGAC	CUGAUGAG	X CGAA	AAUCUAC	1429
1119	AGAUUAGU	C AUUAUCACU	294	AGUGAUUU	CUGAUGAG	X CGAA	ACUAUUCU	1430
1122	UUAUGCAU	C ACUCAUUA	295	AUUAGUGA	CUGAUGAG	X CGAA	AUGACUAA	1431
1124	AGUCAUUA	C UCUAAUUA	296	AUAUUAGU	CUGAUGAG	X CGAA	AUAUAGCU	1432
1128	AUAUCACU	A AUUAUCUA	297	UAUAUUAU	CUGAUGAG	X CGAA	AGUGAUUU	1433
1131	UCAUAUUA	A UCUAAACA	298	UGUUAUGA	CUGAUGAG	X CGAA	AUUAUGUA	1434
1133	ACUAAUUA	C UUAACAAC	299	GUUGUUAU	CUGAUGAG	X CGAA	AUAUUAGU	1435
1136	AAUUAUUA	C AUAACAUA	300	UCUGUUUU	CUGAUGAG	X CGAA	AGUAUUAU	1436
1147	AACAGAAU	C UAAUUAUC	301	GAAGAUUA	CUGAUGAG	X CGAA	AUUCUUAU	1437
1149	CAGAAUUA	C AUUCUUAU	302	AUGAAGAU	CUGAUGAG	X CGAA	AGAUUCUG	1438
1152	AAUCUUAU	C UUCAUUUA	303	UAAUAGAA	CUGAUGAG	X CGAA	AUUAUUAU	1439
1154	UCUAAUUA	C AUUUUAAG	304	CUUAAUUG	CUGAUGAG	X CGAA	AGAUUAGA	1440
1155	CUAAUCUU	C AUUUUAGG	305	CCUUAUUU	CUGAUGAG	X CGAA	AAUAUUAG	1441
1158	AUCUUAUU	U UAAGGCAC	306	GUGCCUUA	CUGAUGAG	X CGAA	AUGAAGAU	1442
1159	UCUUAUUU	U AAGGCACU	307	AGUGCCUU	CUGAUGAG	X CGAA	AAUGAAGA	1443
1160	CUUCUUUU	A AGGCACUG	308	CAGUGCCU	CUGAUGAG	X CGAA	AAUAUGAG	1444
1170	GGCACUGU	A GUGAAUUA	309	UAAUUCAC	CUGAUGAG	X CGAA	ACAGUGCC	1445
1177	UAGUGAAU	U AUUCUGAGC	310	GCUCAGAU	CUGAUGAG	X CGAA	AUUCACUA	1446
1178	AGUGAAUU	A UCUGAGCU	311	AGCUCAGA	CUGAUGAG	X CGAA	AAUUAUCU	1447
1180	UGAUUUUU	C UGAGCUAG	312	CUAGCUCA	CUGAUGAG	X CGAA	AUAUUUCA	1448
1187	UCUGAGCU	A GAGUUACC	313	GGUAAUCU	CUGAUGAG	X CGAA	AGCUCAGA	1449
1192	GCUAGAGU	U ACCUAGCU	314	AGCUAGGU	CUGAUGAG	X CGAA	ACUCUAGC	1450
1193	CUAGAGUU	A CCUAGCUU	315	AGCUUAGG	CUGAUGAG	X CGAA	AAUCUAGC	1451
1197	AGUUAUCC	A CGUUUACA	316	UGGUAAGC	CUGAUGAG	X CGAA	AGGUAAAU	1452
1201	ACCUAGCU	U ACCAUACU	317	AGUAUUGU	CUGAUGAG	X CGAA	AGCUAGGU	1453
1202	CUAGGCUU	A CCUAUCUA	318	UAGUAUUG	CUGAUGAG	X CGAA	AAGCUAGC	1454
1207	CUUACCAU	A CUAUUAUC	319	AGAUUAUG	CUGAUGAG	X CGAA	AGGUUAAG	1455
1210	ACCAUACU	A UAUUUUUG	320	CAAAGAUU	CUGAUGAG	X CGAA	AGUAUUGU	1456
1212	CAUACUUA	A UCUUUUGA	321	UCCAAAGA	CUGAUGAG	X CGAA	AUAGUAUG	1457
1214	UAUCUUAU	C UUUUGAAU	322	AUCCAAA	CUGAUGAG	X CGAA	AUAUAGUA	1458
1216	CUAAUUCU	U UGGAUACA	323	UGAUUCCA	CUGAUGAG	X CGAA	AGUAUUAU	1459
1217	UAUAUCUU	U GGAAUUCU	324	AGAUUCCC	CUGAUGAG	X CGAA	AAGAUUAU	1460

Table 24

1223	UUUGGAAU C AUGAAACC	325	GGUUUCAU CUGAUGAG X CGAA AUUCCAAA	1461
1233	UGAAACCU U AAGACUUC	326	GAGUCU CUGAUGAG X CGAA AGGUUCCA	1462
1234	GAAACCUU A AGACUUA	327	UGAAGUCU CUGAUGAG X CGAA AAGGUUUC	1463
1240	UUAGACU U CAGAUAUA	328	UCAUUCUG CUGAUGAG X CGAA AGUUAUAA	1464
1241	UAAGACU C AGAAUGAU	329	AUCAUUCU CUGAUGAG X CGAA AAGUCUUA	1465
1250	AGAAUGAU U UUGCAGGU	330	ACCUGCAA CUGAUGAG X CGAA AUCAUUCU	1466
1251	GAAUGAU U UGCAGGUU	331	AACUCGCA CUGAUGAG X CGAA AAUUAUUC	1467
1252	AAGAUAUU U GCAGGUUG	332	CAACUGC CUGAUGAG X CGAA AAAUCAUU	1468
1259	UUGCAGGU U GUCUCCA	333	UGGAAGAC CUGAUGAG X CGAA ACCUGCAA	1469
1262	CAGGUUUC U UUUCAUUC	334	GAAUGGAA CUGAUGAG X CGAA ACAACUUG	1470
1264	GGUUGUCU U CCAUCCA	335	UGGAUUG CUGAUGAG X CGAA AGACAACC	1471
1265	GUGUUCU C CAUCCAG	336	CUGGAUUG CUGAUGAG X CGAA AAGACACC	1472
1269	UCUCCAUC U CCAGCUUA	337	UAGGCUUG CUGAUGAG X CGAA AUGGAAGA	1473
1270	UAUCCAUU C CAGCUAA	338	UAGGCUUG CUGAUGAG X CGAA AUGGAAGA	1474
1277	UCCAGCCU A ACAUCCAA	339	UUGAUAU CUGAUGAG X CGAA AGGCUUGA	1475
1282	CCUAACAU C CAUCCAG	340	CUGCAUUG CUGAUGAG X CGAA AUGUAGG	1476
1302	AGGAAAUU A AAGAUUU	341	AAAUUUU CUGAUGAG X CGAA AUUUUUUU	1477
1309	UAAAGAU U UCCAGUA	342	UCACUGGA CUGAUGAG X CGAA AUUUUUUA	1478
1310	AAAAGAU U CCAGUGAC	343	GUCACUG CUGAUGAG X CGAA AAUUUUUU	1479
1311	AAAGAUU C CAGGACA	344	UGUCAUG CUGAUGAG X CGAA AAUUAUUU	1480
1327	AGAAAAAU A UAUAUUCU	345	AGAUUAU CUGAUGAG X CGAA AUUUUUUU	1481
1329	AAAAUAU A UAUAUUA	346	UGAGUAU CUGAUGAG X CGAA AUUAUUUU	1482
1331	AAUAUAU U AUUCUAG	347	CUUGAGAU CUGAUGAG X CGAA AUUAUUUU	1483
1332	AAUAUAU A UCUCAGU	348	ACUUGAGA CUGAUGAG X CGAA AUUAUUUU	1484
1334	UAUAUAU C UCAUAUA	349	AUAUCUGA CUGAUGAG X CGAA AUUAUUUA	1485
1336	UAUAUAU C AAGUAUUU	350	AAUAUAU CUGAUGAG X CGAA AGAUUAUA	1486
1341	UCUCAAGU A UUUUUUA	351	UUAAAAA CUGAUGAG X CGAA ACUUGAGA	1487
1343	UCAGUAU U UUUAAAA	352	UUUAAAA CUGAUGAG X CGAA AUACUUGA	1488
1344	CAAGUAU U UUUAAAA	353	UUUUAAA CUGAUGAG X CGAA AAUACUUG	1489
1345	AAUAUAU U UAUAUAU	354	AUUUUUA CUGAUGAG X CGAA AAUAUAU	1490
1346	AGUAUUU U UAAAAUA	355	AUUUUUA CUGAUGAG X CGAA AAUAUAU	1491
1347	GUUAUUU U AAAUAUA	356	AUAUUUU CUGAUGAG X CGAA AAAUAUA	1492
1348	UAUUUUU A AAAUAUA	357	UAUAUUU CUGAUGAG X CGAA AAAUAUA	1493
1354	UUAAAAU A UAUAUAU	358	AAUAUAU CUGAUGAG X CGAA AUUUUUUA	1494
1356	AAAAUAU A UGAUAUUCU	359	AGAAUAU CUGAUGAG X CGAA AUUAUUUU	1495
1362	AUAUGAU U UCUCUCC	360	GGAGAGAG CUGAUGAG X CGAA AUUCUAU	1496
1363	AUAUAU C UCUCUCCA	361	UGGAGAGA CUGAUGAG X CGAA AUUAUAU	1497
1365	UGAUAUUCU C UCUCCAA	362	UUUGGAGA CUGAUGAG X CGAA AGAAUUA	1498
1367	AAUUCUCU C UCCAAUA	363	AAUUGGA CUGAUGAG X CGAA AGAGAAU	1499
1369	UUUCUCU C CAUAUAU	364	AAUAUUU CUGAUGAG X CGAA AGAGAAU	1500
1375	CUCCAAU A UAUAUAU	365	UAUAUAU CUGAUGAG X CGAA AUUUGGAG	1501
1377	CCAAUAU U AACUAUU	366	AAUAUUU CUGAUGAG X CGAA AUUAUUUG	1502
1378	CAAAUAU A ACUAUAU	367	UAUAUUU CUGAUGAG X CGAA AAUAUUUG	1503
1382	UAUAUAU A AUUAUAU	368	CUAAUAU CUGAUGAG X CGAA AGUAUAU	1504
1385	UAUAUAU U AUUAUAU	369	AAUAUAU CUGAUGAG X CGAA AUUAUAU	1505
1386	AACUAUAU A UAUAUAU	370	UAUAUAU CUGAUGAG X CGAA AAUAUAU	1506
1388	CUAAUAU U AGUAUAU	371	UAUAUAU CUGAUGAG X CGAA AUUAUAU	1507

Table 24

1389	UAAUUAUU A GAUUAU	372	AUAUAUC CUGAUGAG X CGAA AAUAAUUA	1508
1393	UAUUAUUAU U AUAUUUUG	373	CAAAUAU CUGAUGAG X CGAA AUCUAAUA	1509
1394	AUUAGAUU A UAUUUUGA	374	UCAAAAUA CUGAUGAG X CGAA AAUUAUUA	1510
1396	UAGAUAUA A UUUUGAAA	375	UUUCAAAA CUGAUGAG X CGAA AUAUUAUA	1511
1398	GAUUAUAU U UUGAAUUG	376	CAUUAUUA CUGAUGAG X CGAA AUAUAUUA	1512
1399	AUUAUAUU U UGAAAUUGA	377	UCAUUUCA CUGAUGAG X CGAA AAUAUAUA	1513
1400	UUAUAUUU U GAAUAUGA	378	UUAUAUUU CUGAUGAG X CGAA AAUAUAUA	1514
1411	AAUGAACU U GUUGGCCC	379	GGGCCAAC CUGAUGAG X CGAA AGUUAUUA	1515
1414	GAACUUGU U GGCCCAUC	380	GAUGGGCC CUGAUGAG X CGAA ACAAGUUC	1516
1422	UGGCCCAU C UAUUACAU	381	AUGUAUAU CUGAUGAG X CGAA AUGGCCCA	1517
1424	GCCCAUCU A UUAACUUC	382	AGAUGUAA CUGAUGAG X CGAA AGAUGGCC	1518
1426	CCAUCUAU U ACACUAC	383	GUAGAUGU CUGAUGAG X CGAA AUAUGG	1519
1427	CAUCUAUU A CAUCUACA	384	UGUAGAUG CUGAUGAG X CGAA AAUAGAUG	1520
1431	UAUUAACU C UACAGCUG	385	CAGCUUAU CUGAUGAG X CGAA AUGUAUAU	1521
1433	UAUUAUCU A CAGCUGAC	386	GUCAGCUG CUGAUGAG X CGAA AGAUGUAA	1522
1445	CUGGCCUU U GAACAUGG	387	CCAUGUUC CUGAUGAG X CGAA AGGUCUAG	1523
1458	AUGGGGUU U AGGGGAGC	388	GCUCCCUU CUGAUGAG X CGAA ACCCCUAG	1524
1459	UGGGGGUU A GGGGAGCU	389	AGCUCUCC CUGAUGAG X CGAA AACCCCA	1525
1474	CUGACAUA U CGUGGUGC	390	GACCCACG CUGAUGAG X CGAA AUUGUCAG	1526
1475	UGACAUAU C GUGGUGCC	391	GGACCAC CUGAUGAG X CGAA AAUUGUCA	1527
1482	UCUGGGGU C CGCAAAU	392	AUUUUGCG CUGAUGAG X CGAA ACCCACGA	1528
1491	CGCAAAU C UUAACUAC	393	GUAGUUA CUGAUGAG X CGAA AUUUUGCG	1529
1493	CAAAAUUC U AACUACCU	394	AGGUAGUU CUGAUGAG X CGAA AGAUUUUG	1530
1494	AAAUUCUU A ACUACCUA	395	UAGGUAGU CUGAUGAG X CGAA AAGAUUUU	1531
1498	UCUUAACU A CCUAUUG	396	CUAUUAGG CUGAUGAG X CGAA AGUUAAGA	1532
1502	AACUACCU A AUAGCCUA	397	UAGGCUAU CUGAUGAG X CGAA AGGUAGUU	1533
1505	UACCUAAU A GCCUACUA	398	UAGUAGGC CUGAUGAG X CGAA AUUAGGUA	1534
1510	AAUAGCCU A CUUUGAC	399	GUCAUAG CUGAUGAG X CGAA AGGCUAUU	1535
1513	AGCCUACU A UUGACCAU	400	AUGGUCAA CUGAUGAG X CGAA AGUAGGCU	1536
1515	CCUACUAU U GACCAUAA	401	UAUUGGUC CUGAUGAG X CGAA AUAGUAGU	1537
1522	UUGACCAU A ACCUUAAC	402	GUAGGUUU CUGAUGAG X CGAA AUGGUCAA	1538
1528	AUAUAACU U ACUGAUAA	403	UAUACAGU CUGAUGAG X CGAA AGGUUUUA	1539
1529	UAUAACUU A CUGUAUAC	404	GUUAUACG CUGAUGAG X CGAA AAGGUUUA	1540
1535	UAUCUGAU A ACUAUAAC	405	GUUAUGUU CUGAUGAG X CGAA AUACGUAA	1541
1540	GAUAACAU A AACAGUAA	406	UAUCUGUU CUGAUGAG X CGAA AUGUUAUC	1542
1547	UAUAACAGU A AAUUAACA	407	UGUUAUUU CUGAUGAG X CGAA ACUGUUUA	1543
1551	CAUUAUUU U AACACUAU	408	UAUGUUUU CUGAUGAG X CGAA AUUUACUG	1544
1552	AGUAAUUU A ACACAUUA	409	AUAUGUGU CUGAUGAG X CGAA AAUUUAUC	1545
1559	UAACACAU U UUUUGGCU	410	ACGCAAAA CUGAUGAG X CGAA AUGGUUAU	1546
1561	ACACAUUA U UUGCGUGU	411	ACACGCAA CUGAUGAG X CGAA AUUUGUGU	1547
1562	CACAUUUU U UGCGUGUU	412	AACACGCA CUGAUGAG X CGAA AAUUAUGU	1548
1563	ACAUUAUU U GCGUGUUA	413	UAACACGC CUGAUGAG X CGAA AAUUAUGU	1549
1570	UUGCGUGU U UAUGUAU	414	UAACAUUU CUGAUGAG X CGAA ACACGCAA	1550
1571	UGCGUGUU U UAUGUAUU	415	AAUACAUU CUGAUGAG X CGAA AACACGCA	1551
1573	CGUUGUAU A UGUUAUAU	416	AUAUAACA CUGAUGAG X CGAA AUAACACG	1552
1577	UAUUAUGU A UUAUACAC	417	GUGUAUAA CUGAUGAG X CGAA ACAUAUAA	1553
1579	AUAUGUAU U AUACACUA	418	UAGUGUAU CUGAUGAG X CGAA AUACAUUA	1554

Table 24

1580	UAUGUAU A UACACU	419	AUAGUGUA CUGAUGAG X CGAA AAUACAUA	1555
1582	UGUAUUU A CACUAU	420	AUAUAGUG CUGAUGAG X CGAA AUAUAACA	1556
1587	UAUACACU A UAUUCCUA	421	UAGGAAUA CUGAUGAG X CGAA AGUGUAUA	1557
1589	UACACUAU A UUCCUACA	422	UGUAGGAA CUGAUGAG X CGAA AUAUGUGA	1558
1591	CACUAUAU U CCUACAAU	423	AUUGUAGG CUGAUGAG X CGAA AUAUAGUG	1559
1592	ACUAUAU C CUACAAUA	424	UAUUGUAG CUGAUGAG X CGAA AAUAUAGU	1560
1595	AUAUCCU A CAUAUAAAG	425	CUUAUUUG CUGAUGAG X CGAA AGGAUAU	1561
1600	CCUACAAU A AAGUAAGC	426	GCUUACUU CUGAUGAG X CGAA AUUGUAGG	1562
1605	AAUAAAGU A AGCUAGAG	427	CUCUAGCU CUGAUGAG X CGAA ACUUUAUU	1563
1610	AGUAAGCU A GAGAAAU	428	AUUUUCUC CUGAUGAG X CGAA AGCUUACU	1564
1621	GAAAAGU U AUUAGAA	429	UUCUAAU CUGAUGAG X CGAA ACAUUUUC	1565
1622	AAAAGUU U UUAGAAA	430	UUUCUAAA CUGAUGAG X CGAA AACUUUU	1566
1624	AAUGUAU U UAGAAAU	431	AUUUUCUA CUGAUGAG X CGAA AUAACAUA	1567
1625	AUGUAUU U AGAAAUUC	432	GAUUUUCU CUGAUGAG X CGAA AAUAACA	1568
1626	UGUAUUU A GAAAUACA	433	UGAUUUUC CUGAUGAG X CGAA AAUAACA	1569

Input Sequence = PLN. Cut Site = UH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)

PLN (Homo sapiens phospholemban (PLN) mRNA., 1635 bp)

Table 25

Table 25: Human Phospholamban (PLN) NCH Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
15	CAGAAAC U AGCUAAAC	434	GUUUAGCU CUGAUGAG X CGAA IUUUUCUG	1570
17	GAAACUUC C CUAACAC	435	GUUUUAG CUGAUGAG X CGAA IAGUUUUC	1571
18	AAAACUCC C UAAACACC	436	GUUUUUA CUGAUGAG X CGAA IGAGUUUU	1572
19	AAACUCCC C AAACACCC	437	GGGUUUU CUGAUGAG X CGAA IGGAGUUU	1573
20	UACUCCCC A AACACCCG	438	CGGUUUU CUGAUGAG X CGAA IGGAGUUU	1574
23	UCCCCAGC U ACCCGUAA	439	UUACGGGU CUGAUGAG X CGAA ICGGGGGA	1575
28	AGCUAAAC A UAAAGACU	440	AAGUCUUA CUGAUGAG X CGAA IUUUAGCU	1576
30	CUAAACAC C AGACUUA	441	UGAAGUCU CUGAUGAG X CGAA IUGUUUAG	1577
31	UAAACACC C GACUUAU	442	AUGAAGUC CUGAUGAG X CGAA IUGUUUUA	1578
39	CGUAAAGC U ACAACACA	443	UGUGUUGU CUGAUGAG X CGAA IUCUUACG	1579
42	AAGACUUC A ACACAUA	444	UAUUUGU CUGAUGAG X CGAA IUAUUUAG	1580
46	CUUCAUAC A AAUACUCU	445	AGAGUAUU CUGAUGAG X CGAA IUAUGAAG	1581
49	CAUACAAC A UCUCUAU	446	UAUAGAGU CUGAUGAG X CGAA IUUUUAGU	1582
51	UAACAAC C ACUUUACU	447	AGUAUAGA CUGAUGAG X CGAA IUGUUUGA	1583
56	CACAAUAC U ACUGUGAU	448	AUCACAGU CUGAUGAG X CGAA IUAUUUGU	1584
58	CAAUACUC U UGUUGAUA	449	UCAUCACA CUGAUGAG X CGAA IAGUAUUG	1585
63	CUCAUAUC U AGGUAACA	450	UGUGAUA CUGAUGAG X CGAA IUAUAGAG	1586
73	UGAUGAUC A UGCCAAGG	451	CCUUGGCA CUGAUGAG X CGAA IAUCAUCA	1587
75	AUGAUCAC A CCAAGGCU	452	AGCCUUGG CUGAUGAG X CGAA IUGAUCAU	1588
78	AGCACAGC U AGGCUACC	453	GGUAAGCU CUGAUGAG X CGAA ICGUUGAU	1589
81	ACAGCUGC C CUACCURA	454	UUAGGUAG CUGAUGAG X CGAA ICAAGCUGU	1590
82	CAGCUGCC A UACCURAA	455	UUUAGGUA CUGAUGAG X CGAA IGCAGCUG	1591
87	GCCAAGGC U AAAAGAAG	456	CUUCUUUU CUGAUGAG X CGAA ICCUUGGC	1592
90	AAGGCUAC C AGAAGACA	457	UGUCUUCU CUGAUGAG X CGAA IUAGCCUU	1593
91	AGGCUACC U GAAGACAG	458	CUGUCUUC CUGAUGAG X CGAA IGUAGCCU	1594
102	AAGAAGAC A UCUCUAU	459	AUAUGAGA CUGAUGAG X CGAA IUCUUCUU	1595
109	CAGUAUUC U UUUUGGUG	460	CAGCCAAA CUGAUGAG X CGAA IUAUAACU	1596
111	GUUAUCUC A UGGCUGCC	461	GGCAGCCA CUGAUGAG X CGAA IAGAUAAC	1597
120	UAUUUGGC U GCUUUUA	462	UAAAAAGC CUGAUGAG X CGAA ICCAAAUA	1598
123	UUUGCUGC C UUUUAUCU	463	AGAUAAAA CUGAUGAG X CGAA ICAGCCAA	1599
124	UGGCUGCC A UUUUUCUU	464	AAGAUAAA CUGAUGAG X CGAA IGCAGCCA	1600
127	CUGCCAGC U AUCUUUCU	465	AGAAAGAU CUGAUGAG X CGAA ICGGCGAG	1601
135	UUUUUAUC U CUCGACCA	466	UGGUCGAG CUGAUGAG X CGAA IAUAAAAA	1602
139	UUUUTUUC U ACCACUUA	467	UAAGUUGU CUGAUGAG X CGAA IAAAGUAU	1603
141	UCUUUCUC U CACUUAUA	468	UUUAAGUG CUGAUGAG X CGAA IAGAAGA	1604
146	CUCUCGAC C AAAACUUC	469	GAAGUUUU CUGAUGAG X CGAA IUCGAGAG	1605
147	IUCUGACC A AACCUCUA	470	UGAAGUUU CUGAUGAG X CGAA IUGUGAGA	1606
149	UCGACCCAC U ACUUUAGA	471	UCUGAAGU CUGAUGAG X CGAA IUGGUUGA	1607
156	CUAAAAAC U ACUUCCUG	472	CAGGAAGU CUGAUGAG X CGAA IUUUUJAG	1608
159	AAACUCUC A AAACGUCC	473	GGACAGGA CUGAUGAG X CGAA IAAAGUUU	1609
163	CUUCAGAC U GUCCUGCU	474	AGCAGGAC CUGAUGAG X CGAA IUCUGAAG	1610
166	CAGACUUC C CUGUGGU	475	ACCAGCAG CUGAUGAG X CGAA IAAUGUCU	1611
167	AGACUUCC U UGCUUGUA	476	UACCAGCA CUGAUGAG X CGAA IGAAGUCU	1612
171	UUCUGUUC C GGUUAUUA	477	AUGAUACC CUGAUGAG X CGAA IACAGGAA	1613

Table 25

172	UCCUGUCC U GUAUCAUG	478	CAUGAUAC CUGAUGAG X CGAA IGACAGGA	1614
175	UGUCCUGC U UCAUGGAG	479	CUCCAUGA CUGAUGAG X CGAA ICAGGACA	1615
182	CUGGUUAC A GAAAGUCC	480	GGACUUUC CUGAUGAG X CGAA IAUACCAG	1616
194	AGAAAGUC C CCUCACUC	481	GAGUGAGG CUGAUGAG X CGAA IACUUUCU	1617
195	GAAAGUCC A CUCACUCG	482	CGAGUGAG CUGAUGAG X CGAA IGACUUUC	1618
200	UCCAAUAC C UGCUCACG	483	CUGAGCGA CUGAUGAG X CGAA IUUAUUGA	1619
201	CCAAUACC U CCUCACGC	484	GCUGAGCG CUGAUGAG X CGAA IGUAUUGG	1620
203	AAUACCUU A CUCACUUA	485	UAGCUGAG CUGAUGAG X CGAA IAGGUUUU	1621
205	UACCUAC C CAGCUUAU	486	UAUAGCUG CUGAUGAG X CGAA IUAGGUUA	1622
209	UACUCUGC U UUAUAGAA	487	UUUUUAUA CUGAUGAG X CGAA ICAGGUGA	1623
211	ACUCUGUC A UAAGAAGA	488	UCUUUUUA CUGAUGAG X CGAA IAGCGUGU	1624
214	CCUCACGC U GAAGAGCC	489	GGCUUUUC CUGAUGAG X CGAA ICUGAGCG	1625
226	AGAAGAGC C CCAUUGAA	490	UUCAAUUG CUGAUGAG X CGAA ICUCUUUC	1626
227	GAUCAGUC U CAUUGAAA	491	UUUCAAUG CUGAUGAG X CGAA IGUCUUUC	1627
229	AGAGCCUC A UUGAAUUG	492	CAUUUCAA CUGAUGAG X CGAA IAGGCUUC	1628
232	GCCUCAAC C AAAUGCCU	493	AGGCAUUU CUGAUGAG X CGAA IUUGAGGC	1629
233	CCUCAACC A AAUGCCUC	494	GAGGCAUU CUGAUGAG X CGAA IGUGAGGC	1630
243	UGAAAUUC C CAAGCACG	495	CGUGCUUG CUGAUGAG X CGAA ICAUUUUA	1631
244	GAAAUUGC U AAGCACGU	496	ACGUGCUU CUGAUGAG X CGAA IGCAUUUC	1632
246	AAUGCCUC A GCAUGUUA	497	UGAGCUGC CUGAUGAG X CGAA IAGGCAUU	1633
249	GCCUCAAC A CGUCAAAA	498	UUUUGACG CUGAUGAG X CGAA IUUGAGGC	1634
253	CAACAAGC A AAAAGCUA	499	UAGCUUUU CUGAUGAG X CGAA ICUUUUUG	1635
258	AGCAGGUC A CUACAGAA	500	UUCUGUAG CUGAUGAG X CGAA IACGUUGU	1636
264	UCAAAAGC U AAUCUAUU	501	AAUAGAUA CUGAUGAG X CGAA ICUUUUUA	1637
267	AAAGCUAC A CUUUUUUA	502	AUAUUUAG CUGAUGAG X CGAA IUAGCUUU	1638
273	ACAGAAUC U AUCAAUUU	503	AAAUUGAU CUGAUGAG X CGAA IAUUCUGU	1639
281	UAUUUAUC A CUGUCUCA	504	UGAGACAG CUGAUGAG X CGAA IAUUUUAU	1640
287	UCAAUUUC U CAUCUUAU	505	UUAAGAUG CUGAUGAG X CGAA IAAUUUGA	1641
291	UUUCUGUC U UUAUUUUG	506	CAUUUUUA CUGAUGAG X CGAA IACAGAAA	1642
293	UCUGUCUC A AAUAUGUC	507	GACAUUUU CUGAUGAG X CGAA IAGACAGA	1643
296	GUCUCAUC U AUGUCUCU	508	AGAGACAU CUGAUGAG X CGAA IAGUAGAC	1644
306	AAUAUGUC U CUGAUCUG	509	CAGAUCAG CUGAUGAG X CGAA IACAUUUU	1645
308	UAUGUCUC U GAUCUGUA	510	UACAGAUU CUGAUGAG X CGAA IAGACAUU	1646
312	UCUCUGUC U UGUUAUAU	511	AUGAUACA CUGAUGAG X CGAA ICAGAGAA	1647
317	UGCUGAUC U CAUCUGUA	512	UCACGAUG CUGAUGAG X CGAA IAUACAGA	1648
323	UCUGUAUC A GAUGCUUC	513	GAAGCAUC CUGAUGAG X CGAA IAUACAGA	1649
333	CGUGAUGC U UGAAGUUC	514	GAACUACA CUGAUGAG X CGAA IAUACAGC	1650
336	GAUGCUUC U AGUUCUUC	515	GCAGAAUC CUGAUGAG X CGAA IAAAGCAU	1651
338	UGCUUCUC U UUCUGCUA	516	UAGCAGAA CUGAUGAG X CGAA IAGAAGCA	1652
346	UGAAGUUC U CAACCUUC	517	AGAGGUUG CUGAUGAG X CGAA IAAUCUUA	1653
349	AGUUCUUC U CCUCUAGA	518	UCUAGAGG CUGAUGAG X CGAA ICAGAACU	1654
352	UCUGCUAC A CUAGAUCU	519	AGAUCUAG CUGAUGAG X CGAA IUAGCAGA	1655
355	GCUCAAC C GAUCUGCA	520	UGCAGUUC CUGAUGAG X CGAA IUUGUAGC	1656
356	CUACAACC U AUCUGCAG	521	UCGCAAGU CUGAUGAG X CGAA IGUGUGAG	1657
358	ACAACCUU U CUGACGUC	522	AGCUGAGU CUGAUGAG X CGAA IAGGUUGU	1658
364	UCUAGAUC U CUUGCCAC	523	GUGGCAAG CUGAUGAG X CGAA IAUUCAGA	1659
367	AGAUUGUC A GCCACUUC	524	GAUGUGGC CUGAUGAG X CGAA ICAGAUUC	1660

Table 25

370	UCUGCAGC U ACAUCAGC	525	GCUGAUGU CUGAUGAG X CGAA ICUGCAGA	1661
374	CAGCUUGC C CAGCUUAA	526	UUAAGCUG CUGAUGAG X CGAA ICAGCUG	1662
375	AGCUUGCC A AGCUUAAA	527	UUUAAGCU CUGAUGAG X CGAA ICAGAGCU	1663
377	CUUGCCAC A CUUAAAAU	528	AUUUUAAG CUGAUGAG X CGAA IUGGCAAG	1664
380	GCCACAUC A AAAAUCUG	529	CAGAUUUU CUGAUGAG X CGAA IAUUGGC	1665
383	ACAUCAGC U AUCUGUCA	530	UGACAGAU CUGAUGAG X CGAA ICUGAUGU	1666
391	UUAAAAUC U UCCEAUGC	531	GCAUGGGA CUGAUGAG X CGAA IAUUUUAA	1667
395	AAUCUGUC A AUGCAGAC	532	GUCUGCAU CUGAUGAG X CGAA IACAGAUU	1668
398	CUGUCAUC C CAGACAGG	533	CCUGUCUG CUGAUGAG X CGAA IAUACAGG	1669
399	UGUCAUCC C AGACAGGA	534	UCCUGUCU CUGAUGAG X CGAA IGAUGACA	1670
400	GUGAUCCC A GACAGGAA	535	UUCUGUC CUGAUGAG X CGAA IGAUGAC	1671
404	UCCCAUGC A GGA AAAACA	536	UGUUUCC CUGAUGAG X CGAA ICAUGGGA	1672
408	AUGCAGAC A AACAUAU	537	AUAUUGUU CUGAUGAG X CGAA IUCUGAU	1673
416	AGGAACA A UGUUAAC	538	GUUAUACA CUGAUGAG X CGAA IUUUUCCU	1674
429	UGUAUAC A ACUUCUG	539	CAGGAAGU CUGAUGAG X CGAA IUUAUACA	1675
433	UACAGAC C CCUGAGUA	540	UACUCAGG CUGAUGAG X CGAA IUCUGUA	1676
434	AACGAGCC A CUGAGUAG	541	CUACUCAG CUGAUGAG X CGAA IUGUCUGU	1677
436	CAGACCAU U GAGUAGAA	542	UUCUACUC CUGAUGAG X CGAA IUGGUCUG	1678
439	ACCACUUC C UAGAAGAG	543	CUUCUCUA CUGAUGAG X CGAA IAGUGUGU	1679
440	CCACUCC U AGAAGAGU	544	ACUCUCUC CUGAUGAG X CGAA IGAUGUGG	1680
456	AGAGUUUC U GAAAGGU	545	ACUUUUUC CUGAUGAG X CGAA IAAACUCU	1681
470	AAAGGUC A UAAGACUA	546	UAGUCUUA CUGAUGAG X CGAA IACCUUUU	1682
481	AUAUAGAC U CUUAUGU	547	ACAAUAG CUGAUGAG X CGAA IUUUUAU	1683
487	ACUAAAC U GUUAACAU	548	AUGGUAAC CUGAUGAG X CGAA IUUUUAGU	1684
497	AUGGUUAC C GUUAUUAU	549	AUGAAUAC CUGAUGAG X CGAA IUAAACUA	1685
498	UUGUUAAC A UAUUCAUC	550	GAUGAAUA CUGAUGAG X CGAA IGUAAACA	1686
508	AUGUAUUC A UUGGAUCU	551	AGAUCCAA CUGAUGAG X CGAA IAAUACAU	1687
511	UAUUAUC U GAUCUUGU	552	ACAAGAUC CUGAUGAG X CGAA IAUAAUA	1688
520	GUUGGAUC U AACAGGAA	553	UUCAGUUG CUGAUGAG X CGAA IAUCCAAC	1689
528	UUGUAUAC A AAGGCUU	554	AAGCCCUU CUGAUGAG X CGAA IUUUACAA	1690
539	AAAAGGCG U UUUCAAAA	555	UUUGGAAA CUGAUGAG X CGAA IUCCUUUU	1691
548	UUAUUUUC A UUAACUUC	556	GAAGUUAA CUGAUGAG X CGAA IAAAUAUA	1692
558	AAAUUAAC U AAUAAGUG	557	CACUUAUU CUGAUGAG X CGAA IUUAUUUU	1693
561	UUAACUUC A AAGUGUAU	558	AUACAUUU CUGAUGAG X CGAA IAAUGUAA	1694
581	UAAAAUGC A UUGAUUUC	559	GAAAUCAA CUGAUGAG X CGAA ICAUUAUU	1695
584	AAUGCAAC U AUUUCUUC	560	GAGGAAAU CUGAUGAG X CGAA IUUGCAUU	1696
594	UUGAUUUC C CAUGGCUU	561	GAGCCUUG CUGAUGAG X CGAA IAAAUCAA	1697
595	UGAUUUCU U AUGGCUCA	562	UGAGCCAU CUGAUGAG X CGAA IGAUAUCA	1698
597	AUUCUUCU C GGCUCACA	563	UGUGAGCC CUGAUGAG X CGAA IAGGAAAU	1699
600	UCCUCAAC A UCACAAAU	564	AUUUGUGA CUGAUGAG X CGAA IUUGAGGA	1700
605	AAACUUGC U AAUUCUA	565	UAGAAAUU CUGAUGAG X CGAA ICCAUUGU	1701
607	CAUGGCUU C UUUCUAUC	566	GAUAGAAA CUGAUGAG X CGAA IAGCCAUU	1702
609	UGGCUAC A UUUUCCCC	567	GGGAUAGA CUGAUGAG X CGAA IUGAGCCA	1703
616	CAAAUUUC U CAAAUUCU	568	AAGAUAUG CUGAUGAG X CGAA IAAAUUGU	1704
620	UUUCUAUC C UCUUUUCU	569	AGAAAAAG CUGAUGAG X CGAA IAUAGAAA	1705
621	UUCUAUCC C CUUUUCUG	570	CAGAAAAG CUGAUGAG X CGAA IGAUAGAA	1706
622	UCUAUCCC A UUUUCUGA	571	UCAGAAAA CUGAUGAG X CGAA IGGAUAGA	1707

Table 25

627	CCCAAAUC U UGAAGAUG	572	CAUCUUCA CUGAUG X CGAA IAUUUGGG	1708
632	AUCUUUUC U AUGAAGAG	573	CUCUUCAU CUGAUG X CGAA IAAAAGAU	1709
659	UUUAAAAC U UGCCAACA	574	UGUUGGCA CUGAUG X CGAA IUUUUAAA	1710
662	AAAACUGC A CAACAAGU	575	ACUUGUUG CUGAUG X CGAA ICAGUUUU	1711
664	AACUGCAC U ACAAGUUC	576	GAACUUGU CUGAUG X CGAA IUGCAGUU	1712
667	UGCACUGC C AGUUCACU	577	AGUGAACU CUGAUG X CGAA ICAGUGCA	1713
668	GCACUUGC A GUUCACUU	578	AAGUGAAC CUGAUG X CGAA IGCAGUGC	1714
671	CUGCCAAC A CACUUAU	579	AUGAAGUG CUGAUG X CGAA IUUGGCGA	1715
677	ACAAGUUC A AUUAUUA	580	UUAUUAU CUGAUG X CGAA IAACTUGU	1716
679	AAGUUCAC U AUUAUAA	581	CUUUAUUA CUGAUG X CGAA IUGAACUU	1717
682	UUACAUUC A UAAAGCAU	582	AUGCUUUA CUGAUG X CGAA IAAUGUAA	1718
693	UAUAAAGC A UUUUACUC	583	GAGUAAAA CUGAUG X CGAA ICUUUUAU	1719
704	AUUUUUAC U UGAGGUGA	584	UACCCUCA CUGAUG X CGAA IUAAAAAU	1720
706	UUUUUACU U AGUGGAU	585	AUUCACCU CUGAUG X CGAA IAGUAAAA	1721
733	UAUAUUAC A AAAAGCUU	586	AAGCUUUU CUGAUG X CGAA IUUAUUUA	1722
744	GUAAAAGC U UAAUACUA	587	UAGUAUUA CUGAUG X CGAA ICUUUUAC	1723
747	AAAGCUUC U UACUAAGU	588	ACUUAUGA CUGAUG X CGAA IAACTUUC	1724
755	UUUAUUAU C AUUUUUCA	589	UGAAAAAU CUGAUG X CGAA IUUAUUAU	1725
767	UAUUUUUC A UUCACCAA	590	UUGGUGAA CUGAUG X CGAA IAAAAUAU	1726
772	UUACGUUC U CAAUAUUC	591	GAUACUUG CUGAUG X CGAA IACCUGAA	1727
775	AGGUCUUC A GUUACAA	592	UUUGAUAC CUGAUG X CGAA IAAAGACU	1728
777	GUCUUCAC C AUCAAGU	593	ACUUUGAU CUGAUG X CGAA UUGAAGAC	1729
778	UCUUCACC A UCAAAAGUA	594	UACUUUGA CUGAUG X CGAA IUGUAGAA	1730
785	CAAGUAUC A AAUAACAC	595	GUGUUUAU CUGAUG X CGAA IAUACUUG	1731
796	GUAAUAA C UGAAGUGU	596	ACACUUA CUGAUG X CGAA IUUAUUAC	1732
798	AAUAACAC A AAGUGUCA	597	UGACACU CUGAUG X CGAA IUGUUAUU	1733
810	GAAGUGUC A UCAAAAUA	598	UAUUUUUA CUGAUG X CGAA IACACUUC	1734
817	CAUAUUC A AGUCCACU	599	AGUGGACU CUGAUG X CGAA IAAUAAUG	1735
826	AAUAGUCC C ACUCCUCA	600	UGAGGAGU CUGAUG X CGAA IACUUAUU	1736
827	AAUAGUCC A CUCCUCAC	601	GUGAGGAG CUGAUG X CGAA IAGCAUUU	1737
829	UAGUCCAC U CCUCACAU	602	AUGUGAGG CUGAUG X CGAA IUGGACUA	1738
833	CCACUGAC U ACAUCUGU	603	ACAGAUUG CUGAUG X CGAA IUACAGUG	1739
835	ACUGACUC C AUCUGUUA	604	UAACAGAU CUGAUG X CGAA IAGUCAGU	1740
836	CUGACUCC U UCUGUAU	605	AUAACAGA CUGAUG X CGAA IAGUGCAG	1741
838	GACUCUCC A UGUUAUCU	606	AGAUAAAC CUGAUG X CGAA IAGGAGUC	1742
840	CUCCUCAC A UUAUCUUA	607	UAAGAUAA CUGAUG X CGAA IUGAGGAG	1743
843	CUCAUUC U UCUAUUA	608	UAUAAGA CUGAUG X CGAA IAUUGUAG	1744
850	CUGUAUUC U AUAAAGAA	609	UUCUUUAU CUGAUG X CGAA IAUAAACG	1745
864	UAAAGAAC U GUAGUAAC	610	GUUAUAC CUGAUG X CGAA IUUCUUUA	1746
877	GUAGUAAC U GRAUCUAC	611	UGAGAUUC CUGAUG X CGAA IUUAUAC	1747
881	UAACUUAUC A CUCAUUC	612	GAUUGUAG CUGAUG X CGAA IAUAGUUA	1748
887	UCAGAUUC U UCAAAAC	613	GUUUUAGA CUGAUG X CGAA IAUUCUGA	1749
890	GAUACUAC A AAAACAGA	614	UCUGUUUU CUGAUG X CGAA IUAGAUUC	1750
894	CUACAUUC U CAGAAAUU	615	AAUUUCAG CUGAUG X CGAA IAAUGUAG	1751
900	UCUAAAAC A UUGUAUUU	616	AAAUACAA CUGAUG X CGAA IUUUUAGA	1752
917	AUUUUUUC U CACAUUA	617	UUAUUGUG CUGAUG X CGAA IAAAAAUU	1753
922	UUCUAUGC C UAACAUCU	618	AGAUGUUA CUGAUG X CGAA ICAUAGAA	1754

Table 25

923	UCUAUGCC A AACAUUU	619	AAGAUGUU CUGAUGAG X CGAA IGCAUAGA	1755
925	UAUGCCAC A CAUCUUUU	620	AAAAGAU CUGAUGAG X CGAA IUGGCAUA	1756
931	ACAUUAA C UUAAGUU	621	AACUUUAA CUGAUGAG X CGAA IUUAUAGU	1757
934	UUACAUC U AAGUUGAU	622	AUCACUU CUGAUGAG X CGAA IAUUGUAA	1758
954	UGAGAUC A UGGAAAAC	623	CUUUCCA CUGAUGAG X CGAA IAUUCA	1759
973	AGUAAGGC C UCUUACAU	624	AUGUAAGA CUGAUGAG X CGAA ICCUUACU	1760
974	GUAGGCC A CUUACAU	625	UAUGAAG CUGAUGAG X CGAA IGCCUAC	1761
978	GGCCAUAC U CAUUAUA	626	UUUAUUG CUGAUGAG X CGAA IUAUGGCC	1762
980	CCAUAUC U UAAUAAA	627	UUUUUAUA CUGAUGAG X CGAA IAGUAUGG	1763
984	ACUCUAC A AAAAUCC	628	GGAAUUU CUGAUGAG X CGAA IUAGAGU	1764
996	UAAAAUC C AAGUAUU	629	AAUUACUU CUGAUGAG X CGAA IAAUUUA	1765
997	AAAUUCC U AGUAUUU	630	AAAUUACU CUGAUGAG X CGAA IGAUUUU	1766
1014	AUUUUU C AUCACAGA	631	UCUGUAU CUGAUGAG X CGAA IAAAAU	1767
1022	AAAGAU C AUUCUAGU	632	ACUAGAU CUGAUGAG X CGAA IAUUCUU	1768
1024	AGAUAC C UCUAGUAC	633	GUACUAGA CUGAUGAG X CGAA IUGAUUCU	1769
1031	CAGAAU C AUGUAGG	634	CCUACAUG CUGAUGAG X CGAA IAAUUCU	1770
1037	UCUAGUAC A GGUAAUC	635	GAUUUACC CUGAUGAG X CGAA IUACUAGA	1771
1050	GGUAAU C UCUUUUU	636	AGAACAGA CUGAUGAG X CGAA IAUUACC	1772
1057	CAUAAU C UAAGACAU	637	AUGUCUUA CUGAUGAG X CGAA IAUUUAG	1773
1062	AUCUGU C CAUUAU	638	AUCAUUG CUGAUGAG X CGAA IAAACAGU	1774
1068	UCUAAG C AUCAACAG	639	CUGUUGAU CUGAUGAG X CGAA IUUCUAGA	1775
1076	AUAUAU C UAAGAAC	640	GUUCUACU CUGAUGAG X CGAA IAUCAU	1776
1079	UGAUCA C AGAACUGG	641	CCAGUUCU CUGAUGAG X CGAA IUUGAUCA	1777
1089	AUGAGA C GUUAUUA	642	AUAUUAC CUGAUGAG X CGAA IUUCUACU	1778
1107	UAUGUG C GAUUUAGU	643	GACUAAU CUGAUGAG X CGAA IUACAU	1779
1120	GAUAGU C ACUAAU	644	AUAUUAGU CUGAUGAG X CGAA IACUAAU	1780
1125	GUCAUAC A UAUCUAA	645	UUAGUAUA CUGAUGAG X CGAA IAUUAGC	1781
1127	CAUAUC C UACUACA	646	UGUUGAUA CUGAUGAG X CGAA IUGAUUG	1782
1135	UAUAUAC U ACAGAAU	647	GAUUCUGU CUGAUGAG X CGAA IUUAUUA	1783
1139	AUACUAC A AAUCUAA	648	AUAGAUU CUGAUGAG X CGAA IUUAUUA	1784
1142	CUACAAC C CUAAUCU	649	AAGAUUAG CUGAUGAG X CGAA IUUGUUG	1785
1148	ACAGAAU C UUCUUA	650	UAAAGUA CUGAUGAG X CGAA IAUUCUGU	1786
1153	AUCUAAU C UUAAGGCA	651	UGCCUUA CUGAUGAG X CGAA IAUUAGU	1787
1156	UAAGUUC A AGGACUG	652	CAGUGCU CUGAUGAG X CGAA IAGAUUA	1788
1165	UUUAAGC A AGUGAAU	653	AAUUCACU CUGAUGAG X CGAA ICCUUAA	1789
1167	UAAGGCAC U UGAUUUA	654	AUAUUUCA CUGAUGAG X CGAA IUGCCUA	1790
1181	GAUUUAU C UAAGUUA	655	UAACUUA CUGAUGAG X CGAA IUAUUU	1791
1186	AUCUGAG C UUAACUAG	656	CUAGGUA CUGAUGAG X CGAA ICUCAGU	1792
1195	AGAGUAC C UUAACUA	657	UAUGGUA CUGAUGAG X CGAA IUAAUUCU	1793
1196	GAGUUAU C UAACUAC	658	GUAGGUA CUGAUGAG X CGAA IGAUACU	1794
1200	UAUCUAG C AUUAUUU	659	UAUAGUA CUGAUGAG X CGAA ICUAGGUA	1795
1204	UAUCUAC C UAUAUUU	660	AAGAUUA CUGAUGAG X CGAA IUAAGCUA	1796
1205	AGCUUAC C AUUAUUU	661	AAAGAUU CUGAUGAG X CGAA IGAUAGCU	1797
1209	UAUCAU C CUUUGGA	662	UUAACAAG CUGAUGAG X CGAA IUAUGGUA	1798
1215	ACUAUAC U AAUCUAA	663	UCAUGAU CUGAUGAG X CGAA IUAUAGU	1799
1224	UUGAAU C ACCUUAAG	664	CUUAAGGU CUGAUGAG X CGAA IAUUCCAA	1800
1231	CAUGAAU C GACUUCAG	665	CUGAAGUC CUGAUGAG X CGAA IUUUCUAG	1801

Table 25

1232	AUGAAACC	U	ACUUCAGA	666	UCUGAAGU	CUGAUGAG	X	CGAA	IGUUUCAU	1802
1239	CUUAAGAC	U	AAGUAUUU	667	AAAUCAUU	CUGAUGAG	X	CGAA	IUCUUAAG	1803
1242	AAGACUUC	A	GAUUUUGC	668	GCAAAAUU	CUGAUGAG	X	CGAA	TAAGUCUU	1804
1255	GAUUUUGC	A	GUUCUCCA	669	UGGAAAGC	CUGAUGAG	X	CGAA	ICAAAUCU	1805
1263	AGGUUGUC	U	UUCCAGCC	670	GGCUGGAA	CUGAUGAG	X	CGAA	IACAACCU	1806
1266	UUGUCUUC	C	CAGCCUAA	671	UUAGGCUU	CUGAUGAG	X	CGAA	TAAGACAA	1807
1267	UUGUCUUC	A	AGCCUAAC	672	GUUAGGCU	CUGAUGAG	X	CGAA	IGAAAGCA	1808
1271	UUCCAUCU	C	UAACAACC	673	GGAGUUUA	CUGAUGAG	X	CGAA	IAAUGGAA	1809
1272	UCCAUCUC	A	AACAUCCA	674	UGGAGUUU	CUGAUGAG	X	CGAA	IGAAUGGA	1810
1275	AUUCACGC	C	AUCCA AUG	675	CAGUUGAU	CUGAUGAG	X	CGAA	ICUGGAAU	1811
1276	UUCCAGCC	U	UCCA AUGC	676	GCAUUGGA	CUGAUGAG	X	CGAA	IGCUGGAA	1812
1280	AGCCUAAC	A	AUGCAGGC	677	GCCUGCAU	CUGAUGAG	X	CGAA	IUAUGGCU	1813
1283	CUAACAUC	C	CAGGCAAG	678	CUUGCCUG	CUGAUGAG	X	CGAA	IAUGUUGU	1814
1284	UAACAUCU	A	AGGCAAGG	679	CCUUGCAU	CUGAUGAG	X	CGAA	IGAUGUUA	1815
1289	UCCA AUGC	A	AGGAAAAU	680	AUUUUCCU	CUGAUGAG	X	CGAA	ICAUUGGA	1816
1293	AUGCAGGC	A	AAAUAAAA	681	UUUUUUUU	CUGAUGAG	X	CGAA	ICCUUGAU	1817
1312	AAGAUAUC	C	ACAGAAAA	682	UUUUUUUU	CUGAUGAG	X	CGAA	IAAUCUUU	1818
1313	AGAUAUUC	A	CAGAAAAA	683	UUUUUUUU	CUGAUGAG	X	CGAA	IGAAUAUC	1819
1319	CCAGUGAC	A	AAUAUAUU	684	AAUAUAUU	CUGAUGAG	X	CGAA	IUCACUGG	1820
1335	AUAUAUUC	U	UAUUUUUU	685	AAAAAUAU	CUGAUGAG	X	CGAA	IAUAUAUU	1821
1337	AUAUAUUC	A	UAUUUUUA	686	UUAUUAAA	CUGAUGAG	X	CGAA	IGAUUAUU	1822
1364	AGAAUAUC	U	CCAAUAUU	687	AUAUUUGG	CUGAUGAG	X	CGAA	IAAUUAUU	1823
1366	GAUAUUCU	U	AAUAUAUU	688	UAUAUAUU	CUGAUGAG	X	CGAA	IAGAAUUC	1824
1368	AUAUCUUC	U	AUAUAUAC	689	GUUAUAUU	CUGAUGAG	X	CGAA	IAAGAAUU	1825
1370	UCUCUCUC	C	AUAUAUAU	690	UAGUUAUU	CUGAUGAG	X	CGAA	IAGAGAGA	1826
1371	CUCUCUCC	A	UUAACUAA	691	UUAGUUAU	CUGAUGAG	X	CGAA	IGAGAGAG	1827
1381	AUAUAUAC	U	AUAUAUUA	692	AAUCUUAU	CUGAUGAG	X	CGAA	IUAUAUUA	1828
1410	AAUAUAUC	U	GGCCAUUC	693	GAUGGGCC	CUGAUGAG	X	CGAA	IUAUAUUA	1829
1418	UUGUUGGC	C	UAUAUAUU	694	AUGUUAUU	CUGAUGAG	X	CGAA	ICCAACAA	1830
1419	UGUUGGCC	C	AUAUAUUC	695	AGUUAUAU	CUGAUGAG	X	CGAA	IGCCAACA	1831
1420	GUUGGCCU	C	UAUAUAUU	696	AGAUGUAA	CUGAUGAG	X	CGAA	IGGCCAAC	1832
1423	GGCCAUUC	U	CAUCUAUA	697	UGUAGUUG	CUGAUGAG	X	CGAA	IAUGGGCC	1833
1429	UCUAUAUC	A	CAGCUGAC	698	GUCAGCUG	CUGAUGAG	X	CGAA	IUAUAUUA	1834
1432	AUAUAUUC	U	CUAGCCUU	699	AGGUGACG	CUGAUGAG	X	CGAA	IAUGUUAU	1835
1435	ACAUAUAC	A	ACCCUUGA	700	UCAAGGGU	CUGAUGAG	X	CGAA	IUAUAUUA	1836
1438	UCUAUACG	U	CUUGAACA	701	UGUUAUAG	CUGAUGAG	X	CGAA	ICUGUAGA	1837
1442	CACUGACG	C	AACAUGGG	702	CCCAUGUU	CUGAUGAG	X	CGAA	IUCACGUG	1838
1443	AGCUGACC	C	ACAUGGGG	703	CCCAUGUU	CUGAUGAG	X	CGAA	IGUCAGCU	1839
1444	GCUGAGCC	U	CAUGGGGG	704	CCCAUGUU	CUGAUGAG	X	CGAA	IGGUCAGC	1840
1450	CCUUGAAC	A	GGUUAAGG	705	CCCUAACC	CUGAUGAG	X	CGAA	IUAUAAGG	1841
1467	AGGGGAGC	U	AUUCGUGG	706	CCACGAUU	CUGAUGAG	X	CGAA	ICUCCUCC	1842
1471	GAGCUGAC	A	GUUGGUCC	707	GGACCCAC	CUGAUGAG	X	CGAA	IUAUCUUC	1843
1483	CGUGGGUC	C	AUUCUUAU	708	UUAAGAUU	CUGAUGAG	X	CGAA	IACCCACG	1844
1486	GGGUCCGC	A	CUUAACUA	709	UAGUUAAG	CUGAUGAG	X	CGAA	ICGAGACC	1845
1492	GCAAAUUC	U	UACCUUAU	710	AUUAGGUA	CUGAUGAG	X	CGAA	IUAUUUUC	1846
1497	AUCUUAUC	U	AAUAGCCU	711	AGGCUAUU	CUGAUGAG	X	CGAA	IUAUAUUA	1847
1500	UUAACUAC	C	AGCCUACU	712	AGUAGGCU	CUGAUGAG	X	CGAA	IUAUGUUA	1848

Table 25

1501	UAAUACC U GCCUACUA	713	UAGUAGGC CUGAUGAG X CGAA IGUAGUUA	1849
1508	CUAAUAGC C AUUGACCA	714	UGGUCAAU CUGAUGAG X CGAA ICUAUUAG	1850
1509	UAAUAGCC U UUGACCAU	715	AUGGUCAA CUGAUGAG X CGAA IGCUAUUA	1851
1512	UAGCCUAC U ACCAUAAA	716	UUUAUGGU CUGAUGAG X CGAA IUAGGCUA	1852
1519	CUAUUGAC C ACCUUACU	717	AGUAAAGU CUGAUGAG X CGAA IUCAAUAG	1853
1520	UAUUGACC A CCUUACUG	718	CAGUAAAG CUGAUGAG X CGAA IGUCAAUA	1854
1526	CCAUAAAC C UGAUAAAC	719	UGUUUAUA CUGAUGAG X CGAA IUUUUAGG	1855
1527	CAUAAACC U GAUAACAU	720	AUGUUUUC CUGAUGAG X CGAA IGUUUAUG	1856
1531	AACCUUAC U ACAUAAAC	721	GUUUUAUG CUGAUGAG X CGAA IUAAAGUU	1857
1538	CUGAUUAC A CAGUAAAU	722	AUUUACUG CUGAUGAG X CGAA IUUAUACG	1858
1544	ACAUAAAC A AUUAACAC	723	GUGUUAAU CUGAUGAG X CGAA IUUUUAUG	1859
1555	AAAUUAAAC A UUUUGCGU	724	ACGCAAAA CUGAUGAG X CGAA IUUAAUUU	1860
1557	AUUAACAC A UUGCGUGU	725	ACACGCAA CUGAUGAG X CGAA IUGUUAAU	1861
1584	UAUUUAUC A AUUCCUAC	726	GUAGGAUU CUGAUGAG X CGAA IUUAUAAU	1862
1586	UUUAUACU U UCCUACAA	727	UUGUAGGA CUGAUGAG X CGAA IUGUAUAA	1863
1593	CUAUUUUC C AUAAAGUA	728	UACUUUAU CUGAUGAG X CGAA IAAUUAUG	1864
1594	UAUAUUCC U UAAAGUAA	729	UUACUUUA CUGAUGAG X CGAA IGAUAUUA	1865
1597	AUUCUAC A AGUAAGCU	730	AGCUUACU CUGAUGAG X CGAA IUAGGAAU	1866
1609	AAGUAAGC U AAAAUGUU	731	AACAUUUU CUGAUGAG X CGAA ICUUACUU	1867

Input Sequence = PLN. Cut Site = CH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)

PLN (Homo sapiens phospholamban (PLN) mRNA.; 1635 bp)

Table 26

Table 26: Human Phospholamban (PLN) G-cleaver Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Re Seq ID
64	UCUUAU G UGAUGAUC	732	GAUCAUA UGAUG GCAUGGACUAUAG GCG AGUAUAAG	1868
66	UAUAGUU G AUGAUCAC	733	GUUAUCAU UGAUG GCAUGGACUAUAG GCG ACAGUAUA	1869
69	ACUGUAU G AUCACAGC	734	GUUGUAU UGAUG GCAUGGACUAUAG GCG AUCACAGU	1870
79	UUCACAGU G CCAGAGCU	735	AGCUCUGG UGAUG GCAUGGACUAUAG GCG AGCUGUGA	1871
121	AUUUGGU G CCAGGUUU	736	AAAGCUGG UGAUG GCAUGGACUAUAG GCG AGCCAAAU	1872
143	UUUCUUC G ACCAUUA	737	UAAGUGGU UGAUG GCAUGGACUAUAG GCG GAGAGAA	1873
168	GACUCCU G UCCUGUCG	738	CAGCAGGA UGAUG GCAUGGACUAUAG GCG AGGAAGUC	1874
173	CUUGUCU G CUGUAUC	739	GUAUACAG UGAUG GCAUGGACUAUAG GCG AGGACAG	1875
207	CUUACUC G CUACAGUA	740	UAGCUGAG UGAUG GCAUGGACUAUAG GCG GAGUGAG	1876
236	CACCAUU G AAUUGCCU	741	AGGCAUUU UGAUG GCAUGGACUAUAG GCG AUGGUGUG	1877
241	AUGAAAU G CCUAACA	742	UGUUGAGG UGAUG GCAUGGACUAUAG GCG AUUUAU	1878
288	CAUUAUCU G UCUUAUCU	743	AGAUAGA UGAUG GCAUGGACUAUAG GCG AGAAUUG	1879
303	CUUAUAU G UCUUUCG	744	GCNAGAGA UGAUG GCAUGGACUAUAG GCG AUUAUAAG	1880
310	UGUUCUU G UCUAUCG	745	CAGAUCAG UGAUG GCAUGGACUAUAG GCG AAGAGACA	1881
313	CUUUAUCU G AUCUGUAU	746	AUACAGAU UGAUG GCAUGGACUAUAG GCG AGCAGAG	1882
318	CGUAUUCU G UAUCAUCG	747	CGAUUAUA UGAUG GCAUGGACUAUAG GCG AGUAUAGC	1883
328	AUCUUCU G AUGGUCU	748	AGAGCAU UGAUG GCAUGGACUAUAG GCG ACCAUGAU	1884
331	AUCUGAU G CUUUCUG	749	CAGAGAG UGAUG GCAUGGACUAUAG GCG AUCAGAU	1885
339	GUUUCUU G AAGUUCG	750	CAGAACUU UGAUG GCAUGGACUAUAG GCG AGAGAGC	1886
347	GAAGUUCU G CUACACCC	751	GGUUGUAG UGAUG GCAUGGACUAUAG GCG AGAACUC	1887
365	CUAGAUU G CAGUUCG	752	GCAUCUG UGAUG GCAUGGACUAUAG GCG AGAUUAG	1888
372	UGAGUUCU G CCACUAUA	753	UAGUUGUG UGAUG GCAUGGACUAUAG GCG AGCUGUCA	1889
392	UAAAUUCU G UCAUCCCA	754	UGGAGAGA UGAUG GCAUGGACUAUAG GCG AGAUUUUA	1890
402	CAUCCAU G CAGACAGG	755	CUUGUCUG UGAUG GCAUGGACUAUAG GCG AUGGAGUG	1891
422	ACAAUAU G UUAUACAG	756	CUUUAUA UGAUG GCAUGGACUAUAG GCG AAUAUUUU	1892
441	CACUUCU G AUUAGAG	757	CUUCUACU UGAUG GCAUGGACUAUAG GCG AGGAAGUG	1893
459	GUUUCUU G UGAAAGG	758	CCUUUACA UGAUG GCAUGGACUAUAG GCG AAGAAGAC	1894
461	UUCUUUGU G AAAGUUC	759	GACUUUUU UGAUG GCAUGGACUAUAG GCG ACAAGAAA	1895

Table 26

492	AACTIAU G UUAACAA	760	UUAUGUAA UGAUG GCAUGCAUAUAG GCG AAUAGUTU	1896
502	UACCAUAG G UAUDCAU	761	GAUGAAUA UGAUG GCAUGCAUAUAG GCG AAUAGUUA	1897
512	AUUCUUCU G UUGGAUCU	762	GAUCCAA UGAUG GCAUGCAUAUAG GCG AGAUGAAU	1898
522	UGGAUCU G UAAACAU	763	CAUGUUA UGAUG GCAUGCAUAUAG GCG AAGAUA	1899
530	GUAAACU G AAAGGCG	764	GCCUUBU UGAUG GCAUGCAUAUAG GCG AUGUBUAC	1900
570	AAUAAU G UAUAARU	765	AUTUUAUA UGAUG GCAUGCAUAUAG GCG ACUUAUA	1901
579	UAUAAAU G CAACUGU	766	AACAGUG UGAUG GCAUGCAUAUAG GCG AUUAUA	1902
585	AUGCAU G UUBAUUC	767	GAUCAA UGAUG GCAUGCAUAUAG GCG ABUUGCA	1903
588	CAACUGU G AUUUCU	768	GAGGAU UGAUG GCAUGCAUAUAG GCG AKAUGU	1904
633	UCUUBU G AAGUAA	769	UTCAUCU UGAUG GCAUGCAUAUAG GCG AAAAAA	1905
639	CUAGAU G AAGUUA	770	AAACUUA UGAUG GCAUGCAUAUAG GCG AUUUCAG	1906
660	UUAACU G CACUGCA	771	UGGCAUG UGAUG GCAUGCAUAUAG GCG AGUUBA	1907
665	ACUGACU G CCAACAG	772	CUUBUGG UGAUG GCAUGCAUAUAG GCG AGUGAGU	1908
710	ACUCUUA G AGRUAAU	773	AUTACCU UGAUG GCAUGCAUAUAG GCG AAAGAGU	1909
715	UUGAGGU G AAUAUAU	774	AUUAUUA UGAUG GCAUGCAUAUAG GCG ACCUAAA	1910
736	AUUAUAU G AAUAUAU	775	AGUUAUA UGAUG GCAUGCAUAUAG GCG AUUGUAU	1911
802	ACKAAU G AAGUGCA	776	UGACAUU UGAUG GCAUGCAUAUAG GCG AUUUGU	1912
807	AUGAGU G UCAUUAU	777	AAUUAUA UGAUG GCAUGCAUAUAG GCG ACUUAU	1913
830	AGUCCAU G ACUCUCA	778	UGAGAGU UGAUG GCAUGCAUAUAG GCG AGUGAGU	1914
844	UACUUCU G UUAUCUUA	779	UAAGUAU UGAUG GCAUGCAUAUAG GCG AGAUGUA	1915
869	ACUUAU G UAGUAACU	780	AGUUAUA UGAUG GCAUGCAUAUAG GCG AAUUGU	1916
907	CAGAAU G UAUUUUU	781	AAAAUAU UGAUG GCAUGCAUAUAG GCG AAUUCUG	1917
920	UUUCUUAU G CCACUAU	782	UAUUGUG UGAUG GCAUGCAUAUAG GCG AUAUAAA	1918
944	UUAAGU G AUGAGAU	783	AUUCUAU UGAUG GCAUGCAUAUAG GCG ACUUBAA	1919
977	AGUUGAU G AGAUAUA	784	UTGAUCU UGAUG GCAUGCAUAUAG GCG AUCAUCU	1920
1039	UAGUACU G UAGUAAA	785	UUUAUUA UGAUG GCAUGCAUAUAG GCG AUGUAUA	1921
1058	AUAUAU G UUCUAGA	786	UUUUAUA UGAUG GCAUGCAUAUAG GCG AGAUBAU	1922
1072	AGACUAU G AUCAACG	787	CUUUGAU UGAUG GCAUGCAUAUAG GCG AUUBUUCU	1923
1083	CAACAGU G AGAACUG	788	CCAGUCU UGAUG GCAUGCAUAUAG GCG AUUCUUG	1924
1102	GUUAUAU G UBAACUG	789	CACUUAU UGAUG GCAUGCAUAUAG GCG AUUUAAC	1925
1104	UUAUAUG G ACACUAG	790	CUCAUCU UGAUG GCAUGCAUAUAG GCG ACUAUUA	1926

Table 26

1110	GUACAGU G AGAUAGU	791	ACUAUUCU UGAUG GCAUGGACUAUGC GCG ACUGUCAC	1927
1168	AAGGACU G UAGUGAU	792	AUUCACUA UGAUG GCAUGGACUAUGC GCG AUGUCUU	1928
1173	ACUGAGU G AAUAUUCU	793	AGAUUUU UGAUG GCAUGGACUAUGC GCG ACUACAGU	1929
1182	AAUAUUCU G AGCUAGG	794	CUCUAGCU UGAUG GCAUGGACUAUGC GCG AGAUUAUU	1930
1226	GGAUCAU G AAACCUA	795	UAGGUBU UGAUG GCAUGGACUAUGC GCG AUGUUCU	1931
1247	UUCAGAU G AUUUUGA	796	UGCAAAU UGAUG GCAUGGACUAUGC GCG AUUCUGAA	1932
1253	AUGAUUU G CAGGUGU	797	ACAAUCU UGAUG GCAUGGACUAUGC GCG AAUAUCU	1933
1260	UGCAGUU G UCUUCU	798	AUGGAGA UGAUG GCAUGGACUAUGC GCG ACCUCGA	1934
1287	CAUCAAU G CAGGCAAG	799	CUGCCUG UGAUG GCAUGGACUAUGC GCG AUGGAGU	1935
1316	UUUCAGU G ACAGAAA	800	UUUUCUG UGAUG GCAUGGACUAUGC GCG ACUGGAA	1936
1358	AAUAUUAU G AAUUCU	801	AGAGAUU UGAUG GCAUGGACUAUGC GCG AUUAUUU	1937
1401	UAUAUUU G AAUGAAC	802	GUCAUUU UGAUG GCAUGGACUAUGC GCG AAUAUUA	1938
1406	UUUGAAU G AACUGUU	803	AAACAUG UGAUG GCAUGGACUAUGC GCG AUUUCAA	1939
1412	AUGACUU G UUGGCCA	804	UGGCCAA UGAUG GCAUGGACUAUGC GCG AAGUUAU	1940
1439	CUACAGU G ACCUUGA	805	UCAAGUU UGAUG GCAUGGACUAUGC GCG ACUGUAG	1941
1446	UGACCCU G AACAUUG	806	CCCAUGU UGAUG GCAUGGACUAUGC GCG AAGGUGA	1942
1468	GCGAGCU G ACNAUUG	807	CGAAUUG UGAUG GCAUGGACUAUGC GCG AGCUCCC	1943
1484	UGGUGUC G CAAAUUCU	808	AGAUUUU UGAUG GCAUGGACUAUGC GCG GAGCCAC	1944
1516	CUACAUU G ACUAUAA	809	UUUAUGU UGAUG GCAUGGACUAUGC GCG AAUAGAG	1945
1532	ACCUUACU G AUACAU	810	UAUUAUU UGAUG GCAUGGACUAUGC GCG AGUAAGU	1946
1564	CAUAUUU G CUGUUAU	811	AUACACG UGAUG GCAUGGACUAUGC GCG AAUAUUG	1947
1568	UUUUGCU G UUAUUGU	812	ACUAUUA UGAUG GCAUGGACUAUGC GCG AGCAAAA	1948
1575	UGUAUAU G UAUAUAC	813	GUUAUAU UGAUG GCAUGGACUAUGC GCG AUUAACA	1949
1619	GCAAAAU G UUAUUUG	814	CUAAUAU UGAUG GCAUGGACUAUGC GCG AUUUUUC	1950

Input Sequence = PLN, Cut Site = YG/M or UG/U.

Stem Length = B, Core Sequence = UGAUG GCAUGGACUAUGC GCG

PLN (Homo sapiens phospholamban (PLN) mRNA; 1635 bp)

Table 27

Table 27: Human Phospholamban (PLN) zynyme Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
64	UCUAUCU G UCAUGAC	732	GAUCAUCA GCGAAAGCGGAGUACAAGGUU	1951
79	UCACACU G UCAAGGU	735	AGCUCUG GCGAAAGCGGAGUACAAGGUU	1952
121	AUUUGGU G CACGUUU	736	AAAGCUG GCGAAAGCGGAGUACAAGGUU	1953
168	GAUUCUU G UCUUGUC	738	CAGCAGA GCGAAAGCGGAGUACAAGGUU	1954
173	CCUUGCU G CUGGUAC	739	GAUACAG GCGAAAGCGGAGUACAAGGUU	1955
207	CUACACU G CUCAGCUA	740	UAGCUGG GCGAAAGCGGAGUACAAGGUU	1956
241	AUUGAAU G CUCAACA	742	UGUUGAG GCGAAAGCGGAGUACAAGGUU	1957
288	CAUUUCU G UCUCAUCU	743	AGAUAGA GCGAAAGCGGAGUACAAGGUU	1958
303	CUAAUUAU G UCUUUGC	744	GCAAGAGA GCGAAAGCGGAGUACAAGGUU	1959
310	UGUCUCU G CUGAUCG	745	CAGAUCG GCGAAAGCGGAGUACAAGGUU	1960
318	GUCAUCU G UAUCAUC	747	CGAUGUA GCGAAAGCGGAGUACAAGGUU	1961
331	AUCUGAU G CUCUUCG	749	CAGAGAG GCGAAAGCGGAGUACAAGGUU	1962
347	GAAGUCU G CUACACC	751	GUUUGAG GCGAAAGCGGAGUACAAGGUU	1963
365	CUAGUCU G CAGUCUC	752	GCAAGUG GCGAAAGCGGAGUACAAGGUU	1964
372	UGAGUCU G CCACUCA	753	UGAUGUG GCGAAAGCGGAGUACAAGGUU	1965
392	UAAAUUU G UCAUCCA	754	UGGAGUA GCGAAAGCGGAGUACAAGGUU	1966
402	CAUCCAU G CAGACAG	755	CCUUCUG GCGAAAGCGGAGUACAAGGUU	1967
422	ACAUAUU G UUAACAG	756	CUGUAUA GCGAAAGCGGAGUACAAGGUU	1968
459	GUUCUUU G UGAAGAAG	758	CCUUUCA GCGAAAGCGGAGUACAAGGUU	1969
492	AACUUUU G UUAACUA	760	UUGGUUA GCGAAAGCGGAGUACAAGGUU	1970
502	UACCAUU G UAUAUC	761	GAUGAUA GCGAAAGCGGAGUACAAGGUU	1971
512	AUACUUU G UUGAUCU	762	AGAUCAA GCGAAAGCGGAGUACAAGGUU	1972
522	UGGAUCU G UAAACUG	763	CAUGUUA GCGAAAGCGGAGUACAAGGUU	1973
570	AAUAAGU G UUAARAU	765	AUUUUUA GCGAAAGCGGAGUACAAGGUU	1974
579	UAUAUAU G CACUUCU	766	AAAGUUG GCGAAAGCGGAGUACAAGGUU	1975
585	AUGACAU G UGAUUC	767	GAUAUCA GCGAAAGCGGAGUACAAGGUU	1976
660	UUAACAU G CACUGCA	771	UGGAGUG GCGAAAGCGGAGUACAAGGUU	1977
665	ACGACU G CCACACAG	772	CUUGUUG GCGAAAGCGGAGUACAAGGUU	1978

Table 27

736	ATUTACAU G UAAAGCU	775	AGCUUUA GCCGAAAGCGGAGTCAAGGUCU AUUTGUAU	1979
807	AUAGAGU G UCATUAU	777	AUAUAUA GCCGAAAGCGGAGTCAAGGUCU ACUTICAU	1980
844	UCACAUU G UUAUCUA	779	UAAAGUA GCCGAAAGCGGAGTCAAGGUCU AAGUAUGA	1981
869	ACUAUAU G UAGUAAC	780	AGUUAUA GCCGAAAGCGGAGTCAAGGUCU AAUAUAGU	1982
907	CAGAAUU G UAUTIBUU	781	AAANAUA GCCGAAAGCGGAGTCAAGGUCU AAUUCUG	1983
920	UUUCUAU G CCACAUA	782	UAAUUGG GCCGAAAGCGGAGTCAAGGUCU AUGAAAAA	1984
1039	UAGUACU G UAGUAUA	785	UUUACUA GCCGAAAGCGGAGTCAAGGUCU AUGUACUA	1985
1058	AUAUAUU G UUCUAGA	786	UCUUAUA GCCGAAAGCGGAGTCAAGGUCU AGAUUAU	1986
1102	GUUAUAU G UGACAGU	789	CACUGUA GCCGAAAGCGGAGTCAAGGUCU AUUAUAC	1987
1168	AGGACU G UAGUGAU	792	AUUCACUA GCCGAAAGCGGAGTCAAGGUCU AGUGCCUU	1988
1253	AUGAUUU G CAGGIBUU	797	ACAGCUG GCCGAAAGCGGAGTCAAGGUCU AAAUAU	1989
1260	UGCAGUU G UCUUCUA	798	AUGGAGA GCCGAAAGCGGAGTCAAGGUCU AACUGUA	1990
1287	CAUCCAU G CAGGCAAG	799	CUUGCCU GCCGAAAGCGGAGTCAAGGUCU AUUGGAU	1991
1412	AUGAAUU G UUGGCCA	804	UGGCCAA GCCGAAAGCGGAGTCAAGGUCU AAGUUAU	1992
1484	UGGUGCC G CAUAUAU	808	AGUUDUG GCCGAAAGCGGAGTCAAGGUCU GAACTCAC	1993
1564	CAUAUUU G CGUGUAU	811	AUAACAG GCCGAAAGCGGAGTCAAGGUCU AAAUAUG	1994
1568	UUUUGGU G UUAUAUG	812	ACAUUAU GCCGAAAGCGGAGTCAAGGUCU AGCAAAA	1995
1575	UGUUAUU G UAUAUAC	813	GUUAUAU GCCGAAAGCGGAGTCAAGGUCU AUUAUACA	1996
1619	GAGAAAU G UUAUUNG	814	CUAAUAU GCCGAAAGCGGAGTCAAGGUCU AUUUDUC	1997
21	ACUCCCA G CUAAAC	815	GUUUAUG GCCGAAAGCGGAGTCAAGGUCU UGGGAGU	1998
32	AACACCC G UAAGAUU	816	AAGUUAU GCCGAAAGCGGAGTCAAGGUCU GGGUUUU	1999
76	UGAUACA G CUGCCAG	817	CUUGCCG GCCGAAAGCGGAGTCAAGGUCU UGUUAUA	2000
85	CUGCCAG G CUACCUA	818	UUAGUAU GCCGAAAGCGGAGTCAAGGUCU CUUGCAG	2001
103	AGAGACA G UAUAUCUA	819	UGAUUAU GCCGAAAGCGGAGTCAAGGUCU UGUUUUU	2002
118	CAUAUUU G CUGCCAG	820	CGUCCG GCCGAAAGCGGAGTCAAGGUCU CAAUAUG	2003
125	GGUCCCA G CUUUUAU	821	AUAAAG GCCGAAAGCGGAGTCAAGGUCU UGGCAGC	2004
177	UCUGUGU G UAUCUUG	822	CAUAUAU GCCGAAAGCGGAGTCAAGGUCU CAGCAGA	2005
191	UGGAGAAA G UCCAUAC	823	GUUUGGA GCCGAAAGCGGAGTCAAGGUCU UUUUACA	2006
212	CUCCUCA G CUUAUAGA	824	UCUUAUG GCCGAAAGCGGAGTCAAGGUCU UGAGCAG	2007
224	UAAGAGA G CCUCACC	825	GGUUGAG GCCGAAAGCGGAGTCAAGGUCU UCUUUAU	2008
251	CUACACA G CAGCUNA	826	UUAGCUG GCCGAAAGCGGAGTCAAGGUCU UUGUUGA	2009

Table 27

255	ACAGCAC G UCAGAGC	827	GCUTUUGA GCCGAAGGCGAGUCAGGUCU GUUCUGU	2010
262	GUUCAAA G CUACAGAA	828	UUCUGUAG GCCGAAGGCGAGUCAGGUCU UUGUGACG	2011
326	GUUACUAC G UGAGUCUU	829	AGCAUCA GCCGAAAGCGAGUCAGGUCU GAUGAUAC	2012
342	UCUCUGAA G UUCUGCUU	830	UAGCAGAA GCCGAAGGCGAGUCAGGUCU UUCAGAAU	2013
368	GAUCUGCA G CUUGCCAC	831	GUUGCAAG GCCGAAGGCGAGUCAGGUCU UGCAGAU	2014
381	CCACAUCA G CUUAAAU	832	AUUTUUAAG GCCGAAAGCGAGUCAGGUCU UGAGUGG	2015
443	CUUCUCUGA G UGAGAGG	833	CUUCUCUA GCCGAAAGCGAGUCAGGUCU UGACGAAG	2016
451	GUAGAGAG G UUUUUUG	834	CAAGAAU GCCGAAAGCGAGUCAGGUCU UUCUUCAC	2017
467	UGAAGAG G UCAAGAUU	835	AUUCUUGA GCCGAAAGCGAGUCAGGUCU CUUUUCAC	2018
537	UGAAAAGG G CUUUUUU	836	AAUUAAG GCCGAAAGCGAGUCAGGUCU CCUUUCA	2019
568	CAAAAUAA G UGUUAAU	837	UUUAUACA GCCGAAGGCGAGUCAGGUCU UUAUUUG	2020
603	UCACUUG G CUCAGAA	838	UUUGUAG GCCGAAAGCGAGUCAGGUCU CAUUGUA	2021
644	UGAGAAG G UUCAGUUU	839	AAACUAAA GCCGAAAGCGAGUCAGGUCU UCUUCUAC	2022
649	AGAGUUU G UUUUAAA	840	UUUUAAA GCCGAAGGCGAGUCAGGUCU UAAUCUC	2023
673	GCCACAA G UUCACUUC	841	GAUGUAA GCCGAAGGCGAGUCAGGUCU UUGUUGC	2024
691	UAUUAAA G CAUUUUU	842	AAUAUUG GCCGAAGGCGAGUCAGGUCU UUUUAUA	2025
713	CUUUUGAG G UGAUUAU	843	UAUAUACA GCCGAAGGCGAGUCAGGUCU CUCAAAG	2026
742	AUGUAAA G CUUCUUU	844	UUAAGAG GCCGAAAGCGAGUCAGGUCU UUUUACU	2027
758	AUAUCAA G UAUUUUU	845	GUAAAUA GCCGAAAGCGAGUCAGGUCU CUGAAAA	2028
769	UUUUUCAG G UCUCACC	846	GUUGAGA GCCGAAGGCGAGUCAGGUCU CUGAAAA	2029
780	UUCACCA G UAUCAAAG	847	CUUGUAU GCCGAAGGCGAGUCAGGUCU UUGUGAA	2030
788	GUUCCAA G UAUUACA	848	UGUUAUA GCCGAAGGCGAGUCAGGUCU UUGUUAU	2031
805	CAAUAGAA G UGUCAUUA	849	UAUUGACA GCCGAAGGCGAGUCAGGUCU UUCUUIUG	2032
823	UGAAAUA G UCCACUGA	850	UCAGUGA GCCGAAGGCGAGUCAGGUCU UAUUUGA	2033
872	UAUUUGA G UAUCUAC	851	GAUUAUA GCCGAAAGCGAGUCAGGUCU UACAAUA	2034
941	CUUUUAAA G UUGAUGAG	852	CUCAUCA GCCGAAGGCGAGUCAGGUCU UUUUAAAG	2035
956	AGAUCAA G UAUGCAA	853	UUUCUAU GCCGAAGGCGAGUCAGGUCU UUGUAU	2036
966	AUGGAAA G UAAGGCCA	854	UGGCCUA GCCGAAGGCGAGUCAGGUCU UUUUCCAU	2037
971	AAAGUAG G CCAUACUC	855	GAGUAUG GCCGAAGGCGAGUCAGGUCU CUUUAUU	2038
1001	CCUUUUA G UAUUUUU	856	AAAUUAU GCCGAAGGCGAGUCAGGUCU UUAARAG	2039
1033	GAUUUCA G UACAUGA	857	UACAUGA GCCGAAGGCGAGUCAGGUCU UGARAUUC	2040

Table 27

1043	ACAUGUAG G UAAAUCAU	858	AUGAUUUA GCCGAAAGCGAGUCAAAGGUU CUACAUGU	2041
1091	GAGACUG G UGGUUAU	859	ATUAAACA GCCGNAAGCGAGUCAAAGGUU CAGUUCU	2042
1094	AACUGUG G UUAUAUG	860	CAUAUUA GCCGAAAGCGAGUCAAAGGUU CACCAUUG	2043
1108	AUGUACA G UGAGAUUA	861	UAUAUCUA GCCGNAAGCGAGUCAAAGGUU UGUACAUA	2044
1117	UGAGUUA G UGUAUCA	862	UGAUUA GA GCCGNAAGCGAGUCAAAGGUU UUAUCUA	2045
1163	CAUUAUG G CACUGUAG	863	CUACAUG GCCGNAAGCGAGUCAAAGGUU CUUAUAUG	2046
1171	GCACUGA G UGAUAUA	864	AUAUAUCA GCCGAAAGCGAGUCAAAGGUU UACAUGUC	2047
1184	UUUAUGA G CUAGAGU	865	AAUCUAG GCCGNAAGCGAGUCAAAGGUU UCAGAUUA	2048
1190	GAGUAGA G UUACCUAG	866	CUAGGUAA GCCGNAAGCGAGUCAAAGGUU UUAUGUC	2049
1198	GUUACCUA G CUUACCAU	867	AUGBUAG GCCGNAAGCGAGUCAAAGGUU UAGGUUAC	2050
1257	UUUUGCAG G UUUGUUC	868	GAAGACNA GCCGNAAGCGAGUCAAAGGUU CUGCAAAA	2051
1273	CAUUCUA G CCUACAU	869	AUUUAGG GCCGNAAGCGAGUCAAAGGUU UGUAUGG	2052
1291	CAUUCAG G CAAGGAAA	870	UUUUUUG GCCGNAAGCGAGUCAAAGGUU CUGCAUUG	2053
1314	GAUUAUA G UGACAGAA	871	UUUUGUA GCCGNAAGCGAGUCAAAGGUU UGUAUUC	2054
1339	UAUUCUA G UAUUUUUU	872	AAAAAUA GCCGNAAGCGAGUCAAAGGUU UUGAGUA	2055
1416	ACUUAUG G CCAUCAU	873	UAGAUGG GCCGNAAGCGAGUCAAAGGUU CACAAGU	2056
1436	CAUUAUA G CUGACCU	874	AGGUUAG GCCGNAAGCGAGUCAAAGGUU UGUAGUG	2057
1456	ACUUGGG G UUAUGGGA	875	UCCCUUA GCCGNAAGCGAGUCAAAGGUU CCGCAUGU	2058
1465	UUAUGGGA G CUGACAU	876	AUUUUGAG GCCGNAAGCGAGUCAAAGGUU UCCCUUAA	2059
1476	GAUAUUC G UGAGUCCG	877	CGGACCA GCCGNAAGCGAGUCAAAGGUU GAUUGUC	2060
1480	AUUGUGG G UCCGAAA	878	UUUGGGA GCCGNAAGCGAGUCAAAGGUU CACGCAU	2061
1506	ACUUAUA G CCUAUAU	879	AUAGUAG GCCGNAAGCGAGUCAAAGGUU UAUUAGGU	2062
1545	CAUUAUA G UAAAUUA	880	UUUAUUA GCCGNAAGCGAGUCAAAGGUU UGUUUUUG	2063
1566	UAUUUGG G UGUUAUAU	881	AUAUUAUA GCCGNAAGCGAGUCAAAGGUU CCAAAUA	2064
1603	ACAUAUA G UGAUUAU	882	CUAGCUUA GCCGNAAGCGAGUCAAAGGUU UUUAUUGU	2065
1607	UUAAGUA G CUAGAGA	883	UUUUCUAG GCCGNAAGCGAGUCAAAGGUU UUUAUUA	2066

Input Sequence = PLN. Cut Site = GY

Stem Length = 8, Core Sequence = GCGaaagGCGaGuaCaaGauGua

PLN (Homo sapiens phospholamban (PLN) mRNA; 1635 bp)

Table 28

Table 28: Human Phospholamban (PLN) DNase and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
44	GACUUCAU A CAACACAA	6	TTGTGTTG GGCTAGCTACAACGA ATGAAGTC	2067
54	AACACAAU A CUCUAUAC	7	GTATAGAG GGCTAGCTACAACGA ATTGTGTT	2068
59	AAUACUCU A UACUGUGA	9	TCACAGTA GGCTAGCTACAACGA AGAGTATT	2069
61	UACUCUAU A CUGUGAUG	10	CATCACAG GGCTAGCTACAACGA ATAGAGTA	2070
88	CCAGGCUU A CCUAAAAG	12	CTTTTAGG GGCTAGCTACAACGA AGCCTTGG	2071
106	AGACAGUU A UCUCUAUU	15	ATATGAGA GGCTAGCTACAACGA AACTGTCT	2072
113	UAUCUCAU A UUGGCGUG	18	CAGCCAAA GGCTAGCTACAACGA ATGAGATA	2073
132	AGCUUUUU A UCUIUUCU	25	GAGAAAAG GGCTAGCTACAACGA AAAAGAGT	2074
179	CUCGUGUU A UCAUGGAG	39	CTCCATGA GGCTAGCTACAACGA ACCAGCAG	2075
198	AGUCCAAU A CCUCACUC	42	GAGTGAGG GGCTAGCTACAACGA ATTGGACT	2076
215	GCUCAGCU A UAAGAAGA	46	TCTTCTTA GGCTAGCTACAACGA AGCTGAGC	2077
265	CACGAAGCU A CAGAAUCU	52	AGATTCTG GGCTAGCTACAACGA AGCTTTTG	2078
274	CAGAAUCU A UUAUUCAA	54	TTGATAAA GGCTAGCTACAACGA AGATTCTG	2079
278	AUCUAUUU A UCAUUUUC	57	GAAATTGA GGCTAGCTACAACGA AAATAGAT	2080
301	AUCUUAUU A UGUUCUUU	67	AAGAGACA GGCTAGCTACAACGA ATTAAGAT	2081
320	UGAUUCUU A UCAUCGUG	72	CACGATGA GGCTAGCTACAACGA ACAGATCA	2082
350	GUUCUGCU A CAACCCUC	80	AGAGGTTG GGCTAGCTACAACGA AGCAGAAC	2083
419	AAACCAAU A UUGUAUAA	91	TTATACAA GGCTAGCTACAACGA ATTGTTTT	2084
424	AAUUAUUG A UAACAGAC	93	GTCTGTTA GGCTAGCTACAACGA ACAATATT	2085
489	UAAACUUU A UUGUUACC	108	GGTAACAA GGCTAGCTACAACGA AAGTTTTA	2086
495	UUUUAUUU A CCAUAUUG	111	ACATATGG GGCTAGCTACAACGA AACATAAA	2087
500	GUUACCAU A UGUUAUUA	112	TGAATACA GGCTAGCTACAACGA ATGGTAAAC	2088
504	CUUAUUGU A UUCAUUCU	113	CAGATGAA GGCTAGCTACAACGA ACATATGG	2089
542	AGGGCUUU A UUUUCAA	123	TTTGAAAA GGCTAGCTACAACGA AAAGCCCT	2090
572	AUAAGUGU A UAAAAUGC	133	GCATTTTA GGCTAGCTACAACGA ACACTTAT	2091
617	AAAUUUUC A UCCCAAUU	144	ATTTGGGA GGCTAGCTACAACGA AGAAATTT	2092
684	CACUUCAU A UUAUAAAG	162	GCTTTATA GGCTAGCTACAACGA ATGAAGTG	2093
686	CCUUAUUA A UUAAGCAU	163	ATGCTTTA GGCTAGCTACAACGA ATATGAAG	2094
696	AAAGCAUU A UUUUUUUC	166	AGTAAGAA GGCTAGCTACAACGA AATGCTTT	2095
702	UUUUUUUU A CUCUUUUG	171	CAAAAGAG GGCTAGCTACAACGA AAAAATAA	2096
719	AGGUGAAU A UAAUUUUA	176	ATAAATTA GGCTAGCTACAACGA ATTCACCT	2097
726	UUUAUUUU A UUAUACAA	180	TTGTAATA GGCTAGCTACAACGA AAATTATA	2098
728	UAAUUUAU A UUAACAAU	181	CATTGTAA GGCTAGCTACAACGA ATAAATTA	2099
731	UUUAUUUU A CAUUGUAA	183	TTACATTG GGCTAGCTACAACGA AATATAAA	2100
753	UUUUUAUU A CUAAGAUU	190	ATACCTAG GGCTAGCTACAACGA ATTAAGAA	2101
760	UACUAAAU A UUUUUUCG	192	CTGAAAAA GGCTAGCTACAACGA ACTTAGTA	2102
782	CACCAAGU A UCAAAUGA	201	TACTTTGA GGCTAGCTACAACGA ACTTGGTG	2103
813	GUGUCAUU A UCAAAAAU	207	ATTTTGAA GGCTAGCTACAACGA AATGACAC	2104
847	CAUCUGUU A UCUIUAUA	216	TAATAAGA GGCTAGCTACAACGA AACAGATG	2105
852	GUUAUCUU A UUAUAAAG	219	CTTTTATA GGCTAGCTACAACGA AAGATAAC	2106
855	AUCUUAUU A UAAAGAAC	221	GTCCTTTA GGCTAGCTACAACGA AATAAGAT	2107
865	AAAGAAAU A UUUUGUAG	223	ACTACAAA GGCTAGCTACAACGA AGTCTCTT	2108
878	UAGUAAAU A UCAGAAUC	228	GATTCGTA GGCTAGCTACAACGA AGTTACTA	2109
888	CAGAAUCU A CAUUCUAA	231	TTAGAAAT GGCTAGCTACAACGA AGATTCTG	2110

Table 28

909	GAAAUUGU	A	UUUUUUUU	236	AGAAAAA	GGCTAGCTACAACGA	ACAATTC	2111
918	UUUUUUUU	A	UGCCACAU	243	ATGTGGCA	GGCTAGCTACAACGA	AGAAAAA	2112
958	AUCAAAGU	A	UGGAAAG	253	CTTTTCCA	GGCTAGCTACAACGA	ACTTGATT	2113
976	AAGGCCAU	A	CUCUUACA	255	TGTAAAGG	GGCTAGCTACAACGA	ATGGCCTT	2114
982	AUACUCUU	A	CAUAAUA	258	TTATTATG	GGCTAGCTACAACGA	AAGAGTAT	2115
1035	AUUCUAGU	A	CAUGUAGG	278	CCTACATG	GGCTAGCTACAACGA	ACTAGAAT	2116
1070	UAAAGCAU	A	UGAUCAAC	287	GTTGATCA	GGCTAGCTACAACGA	ATGTCTTA	2117
1100	UGGUUAUU	A	UGUGACAG	291	CTGTACCA	GGCTAGCTACAACGA	ATTAACCA	2118
1122	UUAUCUAA	A	UCACUAAU	295	ATTAGTGA	GGCTAGCTACAACGA	ATGACTAA	2119
1131	UCACUAAU	A	UACUAAAC	298	TGTTAGTA	GGCTAGCTACAACGA	ATTAGTGA	2120
1133	ACUAAUAU	A	CUAAACAAC	299	GTTGTGAT	GGCTAGCTACAACGA	ATATTAGT	2121
1178	AGUGAAUU	A	UCUGAGCU	311	AGCTCAGA	GGCTAGCTACAACGA	AATTCAC	2122
1193	CUAGAGUU	A	CCUAGCUU	315	AAGCTAGG	GGCTAGCTACAACGA	AATCTAG	2123
1202	CCUAGCUU	A	CCAUAUA	318	TAGTATGG	GGCTAGCTACAACGA	AAGCTAGG	2124
1207	CUUACCAU	A	CUAAUAUC	319	AGATATAG	GGCTAGCTACAACGA	ATGGTAAG	2125
1210	ACCAUAU	A	UAUCUUUG	320	CAAGATA	GGCTAGCTACAACGA	AGTATGGT	2126
1212	CAUAUAU	A	UCUUUGGA	321	TCCAAAGA	GGCTAGCTACAACGA	ATAGTATG	2127
1327	AUAUAAAU	A	UAUUAUCU	345	AGATAATA	GGCTAGCTACAACGA	ATTTTCT	2128
1329	AAAUAAU	A	UAUAUCA	346	TGAGATAA	GGCTAGCTACAACGA	ATATTTT	2129
1332	AAUAUAU	A	UCUCAAGU	348	ACTTGAGA	GGCTAGCTACAACGA	AATATATT	2130
1341	UCUCAAGU	A	UUUUUAAA	351	TTAAAAA	GGCTAGCTACAACGA	ACTTGAGA	2131
1354	UUAAUAU	A	UAUGAAUU	358	AATTCATA	GGCTAGCTACAACGA	ATTTTAA	2132
1356	AAAUAAU	A	UGAAUUCU	359	AGAAATCA	GGCTAGCTACAACGA	ATATTTT	2133
1375	CUCCAAAU	A	UUAACUAA	365	TTAGTTAA	GGCTAGCTACAACGA	ATTGAGG	2134
1386	AACUAAAU	A	UAUAGUUA	370	TAATCTAA	GGCTAGCTACAACGA	AATTAGTT	2135
1394	AUUAUAU	A	UAUUUUGA	374	TCAAAATA	GGCTAGCTACAACGA	AATCTAAT	2136
1396	UAGAUUAU	A	UUUUGAAA	375	TTTCAAAA	GGCTAGCTACAACGA	ATAATCTA	2137
1424	GCCCAUCU	A	UAACAUCU	382	AGATGTAA	GGCTAGCTACAACGA	AGATGGGC	2138
1427	CAUCUAU	A	CAUCUAAC	384	TGTAGATG	GGCTAGCTACAACGA	AATAGATG	2139
1433	UUAACUCU	A	CAGCUGAC	386	GTCAGCTG	GGCTAGCTACAACGA	AGATGTAA	2140
1498	UCUUAACU	A	CCUAUAUG	396	CTATTAGG	GGCTAGCTACAACGA	AGTTAAGA	2141
1510	AUAUAGCU	A	CUAUUGAC	399	GTCAAATG	GGCTAGCTACAACGA	AGGCTATT	2142
1513	AGCCUAUCU	A	UUGAGCAU	400	ATGGTCAA	GGCTAGCTACAACGA	AGTAGGGT	2143
1529	UAAACCUU	A	CUGAUAAC	404	GTTATCAG	GGCTAGCTACAACGA	AAGGTTTA	2144
1559	UUAACAU	A	UUUUGCGU	410	ACGCAAAA	GGCTAGCTACAACGA	ATGTGTTA	2145
1571	UGCGUUAU	A	UAUGUAUU	415	AATACATA	GGCTAGCTACAACGA	AACACGCA	2146
1573	CGUGUUAU	A	UGUAUUAU	416	ATAATACA	GGCTAGCTACAACGA	ATAACACG	2147
1577	UUUAUUGU	A	UAUUAAC	417	GTGTATAA	GGCTAGCTACAACGA	ACATATAA	2148
1580	UAUGUAUU	A	UACACUAU	419	ATAGTGTA	GGCTAGCTACAACGA	AATACATA	2149
1582	UGUAUUAU	A	CACUAUAU	420	ATATAGTG	GGCTAGCTACAACGA	ATAATACA	2150
1587	UUAACAU	A	UAUUCCUA	421	TAGGAATA	GGCTAGCTACAACGA	AGTGTTAT	2151
1589	UACACUAU	A	UUCCUACA	422	TGTAGGAA	GGCTAGCTACAACGA	ATAGTGTA	2152
1595	AUAUUCUU	A	CAUAUAGG	425	CTTATTGG	GGCTAGCTACAACGA	AGGAATAT	2153
1622	AAAAUGUU	A	UUUAGAAA	430	TTTCTAAA	GGCTAGCTACAACGA	AACATTTT	2154
64	UCUAUAUC	G	UGAUAUC	732	GATCATCA	GGCTAGCTACAACGA	AGTATAGA	2155
79	UCACAGCU	G	CCAAGGCU	735	AGCCTTGG	GGCTAGCTACAACGA	AGCTGTGA	2156
121	AUUUGGCU	G	CCAGCUUU	736	AAAGCTGG	GGCTAGCTACAACGA	AGCCAAAT	2157

Table 28

168	GACUUCU	G UCCUGCUG	738	CAGCAGGA	GGCTAGCTACAACGA	AGGAAGTC	2158
173	CCUGUCCU	G CUGGUUUC	739	GATACCAG	GGCTAGCTACAACGA	AGACACGG	2159
207	CCUCACUC	G CUCAGCUA	740	TAGCTGAG	GGCTAGCTACAACGA	GAGTGAGG	2160
241	AUUGAAAU	G CCUCAACA	742	TGTTGAGG	GGCTAGCTACAACGA	ATTTCAT	2161
288	CAAUUUUC	G UCUCUACU	743	AGATGAGA	GGCTAGCTACAACGA	AGAATTGG	2162
303	CUUAUAUU	G UCUCUUGC	744	GCAAGAGA	GGCTAGCTACAACGA	ATATTAA	2163
310	UGUCUCUU	G CUGAUCUG	745	CAGATCAG	GGCTAGCTACAACGA	AAGAGACA	2164
318	GCUGAUCU	G UAUCAUCG	747	CGATGATA	GGCTAGCTACAACGA	AGATCAGC	2165
331	AUCGUGAU	G CUUCUCUG	749	CAGAGAAG	GGCTAGCTACAACGA	ATCAGAT	2166
347	GAAGUUCU	G CUACAACC	751	GGTTGTAG	GGCTAGCTACAACGA	AGAACTTC	2167
365	CUAGAUCU	G CAGCUUGC	752	GCAAGCTG	GGCTAGCTACAACGA	AGATCTAG	2168
372	UGCAGCUU	G CCAUCAUA	753	TGATGTGG	GGCTAGCTACAACGA	AAGCTGCA	2169
392	UAAAAUCU	G UCAUCCCA	754	TGGGATGA	GGCTAGCTACAACGA	AGATTTTA	2170
402	CAUCCCAU	G CACACAGG	755	CTGTCTCG	GGCTAGCTACAACGA	ATGGGATG	2171
422	ACAAUAUU	G UAUAACAG	756	CTGTTATA	GGCTAGCTACAACGA	AATATTGT	2172
459	GUUUCUUU	G UGAAAAAG	758	CCTTTTCA	GGCTAGCTACAACGA	AAAGAAAC	2173
492	AACUUAUU	G UUAACCAU	760	TATGGTAA	GGCTAGCTACAACGA	AATAAGTT	2174
502	UACCAUAU	G UAUCUAUC	761	GATGAATA	GGCTAGCTACAACGA	ATATGGTA	2175
512	AUUAUAUU	G UUGGAUCU	762	AGATCCAA	GGCTAGCTACAACGA	AGATGAAT	2176
522	UGGAUCUU	G UAAACAUG	763	CATGTTTA	GGCTAGCTACAACGA	AAGATCCA	2177
570	AAUAUAGU	G UAUAUAUU	765	ATTTTATA	GGCTAGCTACAACGA	ACTTATTT	2178
579	UAUAUAUU	G CAACUGUU	766	AACAGITG	GGCTAGCTACAACGA	ATTTTATA	2179
585	AUGCAACU	G UUGAUUUC	767	GAAATCAA	GGCTAGCTACAACGA	AGTTGCAT	2180
660	UUAUAAUC	G CACUGCCA	771	TGGCAGTG	GGCTAGCTACAACGA	AGTTTTAA	2181
665	ACUGCACU	G CCAACAAG	772	CTGTGTGG	GGCTAGCTACAACGA	AGTGCACT	2182
736	AUUAUAUU	G UAAAUAGU	775	AGCTTTTA	GGCTAGCTACAACGA	ATTGTAAT	2183
807	AAUGAAGU	G UCAUUAUU	777	AATAATGA	GGCTAGCTACAACGA	ACTTCATT	2184
844	UACAUUCU	G UAUCUUAU	779	TAAGATAA	GGCTAGCTACAACGA	AGATGTGA	2185
869	ACUAUAUU	G UAGUAACU	780	AGTTACTA	GGCTAGCTACAACGA	AAATAGTT	2186
907	CAGAAAUU	G UAUUUUUU	781	AAAAAATA	GGCTAGCTACAACGA	AATTTCTG	2187
920	UUUUUAUU	G CCACAUAU	782	TAATGTGG	GGCTAGCTACAACGA	ATAGAAAA	2188
1039	UAUGACAU	G UAGGUAAA	785	TTTACTTA	GGCTAGCTACAACGA	ATGTACTA	2189
1058	AUAAAUUC	G UUCUAAGA	786	TCTTAGAA	GGCTAGCTACAACGA	AGATTAT	2190
1102	GUUAUAUU	G UGACAGUG	789	CACGTGCA	GGCTAGCTACAACGA	ATATTAC	2191
1168	AAGGCACU	G UAUGUAUU	792	ATTCACTA	GGCTAGCTACAACGA	AGTGCTTT	2192
1253	AUGAUUUU	G CAGGUUGU	797	ACAACCTG	GGCTAGCTACAACGA	AAATCAT	2193
1260	UGCAGGUU	G UCUUCCAU	798	ATGGAAGA	GGCTAGCTACAACGA	AACCTGCA	2194
1287	CAUCCAAU	G CAGGCAAG	799	CTTGCTCG	GGCTAGCTACAACGA	ATGGGATG	2195
1412	AUGAACUU	G UUGGCCCA	804	TGGGCCAA	GGCTAGCTACAACGA	AGTTTCAT	2196
1484	GUGGGUCC	G CAAAUAUC	808	AGATTTTG	GGCTAGCTACAACGA	GGACCCAC	2197
1564	CAUAUUUU	G CGUGUAUU	811	ATAACACG	GGCTAGCTACAACGA	AAAAATAG	2198
1568	UUUUGCGU	G UUAUAUGU	812	ACATATAA	GGCTAGCTACAACGA	ACGCAAAA	2199
1575	UGUUAUAU	G UAUAUAUC	813	GTATAATA	GGCTAGCTACAACGA	ATATAACA	2200
1619	GAAGAAAU	G UAUAUUAG	814	CTAAATAA	GGCTAGCTACAACGA	ATTTTCTC	2201
21	ACUCCOCC	G CUAAACAC	815	GTGTTTGA	GGCTAGCTACAACGA	TGGGGAGT	2202
32	AAACACCC	G UAAGACUU	816	AAGTCTTA	GGCTAGCTACAACGA	GGGTGTTT	2203
76	UAUACACA	G CUGCCAAG	817	CTTGGCAG	GGCTAGCTACAACGA	TGTGATCA	2204

Table 28

85	CUGCCAAG G CUACCUAA	818	TTAGGTAG GGCTAGCTACAACGA CTGCGCAG	2205
103	AGAAGACA G UUAUCUCA	819	TGAGATAA GGCTAGCTACAACGA TGTCTTCT	2206
118	CAUAUUUG G CUGCCAGC	820	GCTGCGCAG GGCTAGCTACAACGA CAAATATG	2207
125	GGCUGCCA G CUUUUUU	821	ATAAAAGG GGCTAGCTACAACGA TGGCAGCC	2208
177	UCCUGCUG G UAUCUAGG	822	CCATGATA GGCTAGCTACAACGA CAGCAGGA	2209
191	UGGAGAAA G UCCAAUAC	823	GTATTGGA GGCTAGCTACAACGA TTTCTCCA	2210
212	CGUCGCUA G CUAUAAAG	824	TCTTATAG GGCTAGCTACAACGA TGAGCGAG	2211
224	UAAGAAAG G CCUCAACC	825	GGTTGAGG GGCTAGCTACAACGA TCTTCTTA	2212
251	CUGAACAA G UCAAGUCA	826	TTGACGTG GGCTAGCTACAACGA TTGTTGAG	2213
255	ACAAGCAC G UCAAAAGC	827	GCTTTTGA GGCTAGCTACAACGA GTGCTTGT	2214
262	CGUCAAAA G CUACAGAA	828	TTCTGTAG GGCTAGCTACAACGA TTTTGACG	2215
326	GUAUCAUC G UGAUGCTU	829	AAGCATCA GGCTAGCTACAACGA GATGATAC	2216
342	UCUCUGAA G UUCUGCUA	830	TAGCAGAA GGCTAGCTACAACGA TTCAGAGA	2217
368	GAUCUGCA G CUUGCCAC	831	GTGGCAAG GGCTAGCTACAACGA TGCAGATC	2218
381	CCACAUCA G CUUAAAUA	832	ATTTTAAG GGCTAGCTACAACGA TGATGTGG	2219
443	CUUCCUGA G UAGAAGAG	833	CTCTTTCTA GGCTAGCTACAACGA TCAGGAAG	2220
451	GUAGAAGA G UUUUUUUG	834	CAAGAAGA GGCTAGCTACAACGA TCTTCTAC	2221
467	GUGAAAGG G UCAAGAUU	835	AATCTTGA GGCTAGCTACAACGA CTTTTCAC	2222
537	UGAAAAGG G CUUUUUUU	836	AAATAAAG GGCTAGCTACAACGA CCTTTTCA	2223
568	CAAAAUAA G UGUUAAUA	837	TTTATACA GGCTAGCTACAACGA TTATTTTG	2224
603	UCACAAGU G CUCACAAA	838	TTTGTGAG GGCTAGCTACAACGA CATGTTGA	2225
644	GAUGAAGA G UUUUGUUU	839	AAACTAAA GGCTAGCTACAACGA TCTTCATC	2226
649	AGAGUUUA G UUUUAAAA	840	TTTTAAAA GGCTAGCTACAACGA TAAACTCT	2227
673	GCCACACA G UUCACUUC	841	GAAGTGAA GGCTAGCTACAACGA TTGTTGGC	2228
691	UAUAUAAA G CAUUAUUU	842	AAATAATG GGCTAGCTACAACGA TTTATATA	2229
713	CUUUUGAG G UGAUAUUA	843	TATATTCA GGCTAGCTACAACGA CTCAAAAG	2230
742	AUGUAAAA G CUUCUUUA	844	TAAAGAA G GGCTAGCTACAACGA TTTTACAT	2231
758	AAUACUAA G UAUUUUUC	845	GAUAAATA GGCTAGCTACAACGA TTAGTATT	2232
769	UUUUUCAA G UGUACACC	846	GGTGAAGA GGCTAGCTACAACGA CTGAUAAA	2233
780	UUCACCAA G UAUCAAAG	847	CTTTGATA GGCTAGCTACAACGA TTGTTGAA	2234
788	GAUACAAA G UAAUAACA	848	TGTTATTA GGCTAGCTACAACGA TTTGATAC	2235
805	CAUAUGAA G UGUCAUUA	849	TAATGACA GGCTAGCTACAACGA TTCTTTTG	2236
823	UCAAUAUA G UCCACUGA	850	TCAATGGA GGCTAGCTACAACGA TATTTTGA	2237
872	UAUUUGUA G UAACUACU	851	GATAGTTA GGCTAGCTACAACGA TACAAATA	2238
941	CUUUUAAA G UUGAUGAG	852	CTCATCAA GGCTAGCTACAACGA TTTAAAAG	2239
956	AGAAUCAA G UAUGGAAA	853	TTTCCATA GGCTAGCTACAACGA TTGATTCT	2240
966	AUGGAAAA G UAAGGCCA	854	TGGCCTTA GGCTAGCTACAACGA TTTTCCAT	2241
971	AAAGUAAG G CCAUACUC	855	GAGTATGG GGCTAGCTACAACGA CTTACTTT	2242
1003	CCUUUAAA G UAAUUUUU	856	AAAAATTA GGCTAGCTACAACGA TTAAAAGG	2243
1033	GAUUUCUA G UACAUUGA	857	TACATGTA GGCTAGCTACAACGA TAGAATTC	2244
1043	ACAUGUAG G UAAUACAU	858	ATGATTTA GGCTAGCTACAACGA TCATATGT	2245
1091	GAGACUG G UGUUUUAU	859	ATTAACCA GGCTAGCTACAACGA CAGTTCTC	2246
1094	AACUGGUG G UUAUUUUG	860	CATATTAA GGCTAGCTACAACGA CACCAGTT	2247
1108	AUGUGACA G UGAGAUUA	861	TAATCTCA GGCTAGCTACAACGA TGTACAT	2248
1117	UGAGAUUA G UCAUAUCA	862	TGATATGA GGCTAGCTACAACGA TAATCTCA	2249
1163	CAUUUAAG G CACUGUAG	863	CTACAGTG GGCTAGCTACAACGA CTTAAATG	2250
1171	GCACUGUA G UGAUUUAU	864	ATAATCTA GGCTAGCTACAACGA TACAGTGC	2251

Table 28

1184	UUAUCUGA	G	CUAGAGUU	865	AACTCTAG	GGCTAGCTACAACGA	TCAGATAA	2252
1190	GAGCTUAGA	G	UUAACCUAG	866	CTAGGTAA	GGCTAGCTACAACGA	TCTAGCTC	2253
1198	GUUACCUA	G	CUUACCAU	867	ATGGTAAG	GGCTAGCTACAACGA	TAGGTAAC	2254
1257	UUUUGCAG	G	UUGUCUUC	868	GAAGACAA	GGCTAGCTACAACGA	CTGCAAAA	2255
1273	CCAUUCCA	G	CCUUAACA	869	ATGTTAGG	GGCTAGCTACAACGA	TGGAATGG	2256
1291	CAUUGCAG	G	CAAGGAAA	870	TTTCTTGG	GGCTAGCTACAACGA	CTGCATTG	2257
1314	GAUUUCCA	G	UGACAGAA	871	TTCTGTCA	GGCTAGCTACAACGA	TGGAATTC	2258
1339	UAUUCUAA	G	UAUUUUUU	872	AAAAAATA	GGCTAGCTACAACGA	TTGAGATA	2259
1416	ACUUGUUG	G	CCCAUCUA	873	TAGATGGG	GGCTAGCTACAACGA	CAACAAGT	2260
1436	CAUCUACA	G	CUGACCCU	874	AGGGTCAG	GGCTAGCTACAACGA	TGTAGATG	2261
1456	ACAUGGGG	G	UUAUGGGG	875	TCCCCTAA	GGCTAGCTACAACGA	CCCATGTT	2262
1465	UUAUGGGG	G	CUGACAAU	876	ATTGTCAG	GGCTAGCTACAACGA	TCCCCTAA	2263
1476	GACAAUUC	G	UGGGUCCG	877	CGGACCCA	GGCTAGCTACAACGA	GAATTGTC	2264
1480	AUUCGUGG	G	UCGCAAAA	878	TTTGCGGA	GGCTAGCTACAACGA	CCACGAAT	2265
1506	ACCUAAUA	G	CCUUAUAU	879	ATAGTAGG	GGCTAGCTACAACGA	TATTAGGT	2266
1545	CAUAAACA	G	UAAAUUAA	880	TTAATTAA	GGCTAGCTACAACGA	TGTTTATG	2267
1566	UAUUUUGC	G	UGUUAUUA	881	ATATAACA	GGCTAGCTACAACGA	GCAAAATA	2268
1603	ACAUAUAA	G	UAAGCUAG	882	CTAGCTTA	GGCTAGCTACAACGA	TTTATTGT	2269
1607	UAAAGUAA	G	CUAGAGAA	883	TTCTCTAG	GGCTAGCTACAACGA	TTACTTTA	2270
13	CGCAGAAA	A	CUCGCCAG	884	CTGGGGAG	GGCTAGCTACAACGA	TTTCTGAC	2271
26	GUCGCUAA	A	CACCGUAA	885	TACGGGTG	GGCTAGCTACAACGA	TTAGCTGG	2272
28	AGCUAAAC	A	CCCGUAG	886	CTTACGGG	GGCTAGCTACAACGA	GTTTAGCT	2273
37	CCCUGAAG	A	CUUCUAUC	887	GTATGAAG	GGCTAGCTACAACGA	CTTACGGG	2274
42	AAGACUAA	A	UACAACAC	888	GTGTTGTA	GGCTAGCTACAACGA	GAAGCTTT	2275
47	UUAUUAUA	A	CACAAUAC	889	GTATTGTG	GGCTAGCTACAACGA	TGTATGAA	2276
49	CAUACAAC	A	CAAUACUC	890	GAGTATTG	GGCTAGCTACAACGA	GTGTATG	2277
52	ACAACACA	A	UACUCUAU	891	ATAGAGTA	GGCTAGCTACAACGA	TGTGTTGT	2278
67	AUACUGUG	A	UGAUCAUA	892	TGTGATCA	GGCTAGCTACAACGA	CACAGTAT	2279
70	CUGUGAUG	A	UCACAGCU	893	AGCTGTGA	GGCTAGCTACAACGA	CATCACAG	2280
73	UGAUGAUC	A	CAGCUGCC	894	GGCAGCTG	GGCTAGCTACAACGA	GATCATCA	2281
100	AAAAGAAG	A	CAGUUAUC	895	GATAACTG	GGCTAGCTACAACGA	CTTCTTTT	2282
111	GUUAUCUC	A	UAUUUGGC	896	GCCAAATA	GGCTAGCTACAACGA	GAGATAAC	2283
144	UUCUCUGG	A	CCACUAAA	897	TTAAGTGG	GGCTAGCTACAACGA	CAGAGAAA	2284
147	UUCGACCC	A	CUUAAAAC	898	GTTTAAAG	GGCTAGCTACAACGA	GGTGGAGA	2285
154	CACUUAUA	A	CUAGACAC	899	GTCTGAAG	GGCTAGCTACAACGA	TTTAAATG	2286
161	AACUUCAG	A	CUUCCUGU	900	ACAGGAAG	GGCTAGCTACAACGA	CTGAAGTT	2287
182	CUGGUUUA	A	UGGAGAAA	901	TTTCTCCA	GGCTAGCTACAACGA	GATACACG	2288
196	AAAGUCCA	A	UAGCUUAC	902	GTGAGGTA	GGCTAGCTACAACGA	TGACCTTT	2289
203	AAUACCUC	A	CUCGUUCA	903	TGAGCGAG	GGCTAGCTACAACGA	GAGGTATT	2290
230	GAGCUUCA	A	CCAUUAGA	904	TTCAATTG	GGCTAGCTACAACGA	TGAGGCTC	2291
233	CCUCAAAC	A	UUUAAUAG	905	CATTTCAA	GGCTAGCTACAACGA	GGTGGAGG	2292
239	CCAUUGAA	A	UGCCUCAA	906	TTGAGGCA	GGCTAGCTACAACGA	TTCAATTG	2293
247	AUGCCUCA	A	CAAGCACG	907	CGTGCTTG	GGCTAGCTACAACGA	TGAGGCAT	2294
253	CACCAAGC	A	CGUCAAUA	908	TTTGTAGC	GGCTAGCTACAACGA	GCTGTGTT	2295
270	GUUACAGA	A	UCUUAUUA	909	TAAATAGA	GGCTAGCTACAACGA	TCTGTAGC	2296
282	AUUUAUCA	A	UUUCUGUC	910	GACAGAAA	GGCTAGCTACAACGA	TGATAAAT	2297
293	UCUGUCUC	A	UCUUAUUA	911	TATTAAAG	GGCTAGCTACAACGA	GAGACAGA	2298

Table 28

299	UCAUCUUA A UAGUCUC	912	GAGACATA GGCTAGCTACAACGA TAAGATGA	2299
314	UCUUGCUG A UCUGUAGC	913	GATACAGA GGCTAGCTACAACGA CAGCAAGA	2300
323	UCUGUAUC A UCGUGAUG	914	CATCACGA GGCTAGCTACAACGA GATACAGA	2301
329	UCAUGUGG A UGUUCUUC	915	GAGAAGCA GGCTAGCTACAACGA CACGATGA	2302
353	CUGCUACA A CCUCUAGA	916	TCTAGAGG GGCTAGCTACAACGA TGTAGCAG	2303
361	ACCUCUAG A UCUGCAGC	917	GCTGCAGA GGCTAGCTACAACGA CTAGAGGT	2304
375	AGCUUGGC A CAUCAGCU	918	AGCTGATG GGCTAGCTACAACGA GGCAGAGT	2305
377	CUUGCCAC A UCAGCUUA	919	TAAGCTGA GGCTAGCTACAACGA GTGGCAAG	2306
388	AGCUUAAA A UCUGUCAU	920	ATGACAGA GGCTAGCTACAACGA TTTAAGCT	2307
395	AUUCUGGC A UCCCAUGC	921	GCATGGGA GGCTAGCTACAACGA GACAGATT	2308
400	GUCAUCCC A UGCAGACA	922	TGCTGCA GGCTAGCTACAACGA GGGATGAC	2309
406	CCAUGCAG A CAGGAAAA	923	TTTTCTGT GGCTAGCTACAACGA CTGCATGG	2310
414	ACAGGAAA A CAUAUUG	924	CAATATTG GGCTAGCTACAACGA TTCTCTGT	2311
417	GGAAAACA A UAUGUUAU	925	ATACAATA GGCTAGCTACAACGA TGTTTTCC	2312
427	AUUGUUAU A CAGACGAC	926	GTGGTCTG GGCTAGCTACAACGA TATACAAT	2313
431	UAUAAACAG A CCACUUC	927	GGAAGTGG GGCTAGCTACAACGA CTGTTATA	2314
434	AACAGACC A CUUCCUGA	928	TCAGGAAG GGCTAGCTACAACGA GGCTCTGT	2315
473	AGGUCAG A UUAAGACU	929	AGTCTTAA GGCTAGCTACAACGA CTTGACCT	2316
479	AGAUUAG A CUAAAAU	930	AGTTTATG GGCTAGCTACAACGA CTTAATCT	2317
485	AGACUAAA A CUUAUUG	931	ACAATAAG GGCTAGCTACAACGA TTTAGTCT	2318
498	UUGUUAAC A UAUGUUAU	932	AATACATA GGCTAGCTACAACGA GGTACAAA	2319
508	AUGUAUUC A UCUGUUGG	933	CCAACAGA GGCTAGCTACAACGA GAATACAT	2320
517	UCUGUUGG A UCUGUAAA	934	TTACAAGA GGCTAGCTACAACGA CCAACAGA	2321
526	UCUGUAAA A CAGUAAAA	935	TTTTCATG GGCTAGCTACAACGA TTACAAGA	2322
528	UUGUAAAC A UGAAAAAG	936	CCTTTTCA GGCTAGCTACAACGA GTTTACAA	2323
552	UUUCAAAC A UUAACUUC	937	GAAGTTAA GGCTAGCTACAACGA TTTTGAAC	2324
556	AAAAAUUA A CUUCAAAA	938	TTTGAAG GGCTAGCTACAACGA TAAATTTT	2325
564	ACUUCAAA A UAAUGUGA	939	TACACTTA GGCTAGCTACAACGA TTTGAAGT	2326
577	UGUAUAAA A UGCAACUG	940	CAGTTGCA GGCTAGCTACAACGA TTTATACA	2327
582	AAAAUGCA A CUGUUGAU	941	ATCAACAG GGCTAGCTACAACGA TGCAATTT	2328
589	AACUGUGG A UUUCCUCA	942	TGAGGAAA GGCTAGCTACAACGA CAACAGTT	2329
598	UUUCCUCA A CAGGCGUC	943	GAGCCATG GGCTAGCTACAACGA TGAGGAAA	2330
600	UCCUCAAC A UGGCUCAC	944	GTGAGCCA GGCTAGCTACAACGA GTTGAGGA	2331
607	CAGGCGUC A CAAUUAUC	945	GAAATTTG GGCTAGCTACAACGA GAGCCATG	2332
611	GCUCACAA A UUCUUAUC	946	GATAGAAA GGCTAGCTACAACGA TTGTGAGC	2333
624	UAUCCCAA A UCUUUUCU	947	AGAAAAAG GGCTAGCTACAACGA TTGGGATA	2334
637	UUUCGAAG A UGAGAGUG	948	ACTCTTCA GGCTAGCTACAACGA CTTCAGAA	2335
657	GUUUUAAA A UGCACAGU	949	CAGTGACG GGCTAGCTACAACGA TTTAAAAA	2336
662	AAAACUGC A CUGCCAAC	950	GTTGGCAG GGCTAGCTACAACGA GCAAGTTT	2337
669	CACUGCCA A CAAGUAGA	951	TGAACCTG GGCTAGCTACAACGA TGCCAGTG	2338
677	ACAAGUUC A CUUCAUAU	952	ATATGAAG GGCTAGCTACAACGA GAACCTGT	2339
682	UUCACUUC A UAUUAAAA	953	TTTATATA GGCTAGCTACAACGA GAAGTGAA	2340
693	UGAAAAAG A UUAUUUUU	954	AAAAATAA GGCTAGCTACAACGA GCTTTATA	2341
717	UAGGUGAA A UUAUAUUU	955	AAATTATA GGCTAGCTACAACGA TCACCTCA	2342
722	UGAAUUAU A UUUUAUUU	956	AATATAAA GGCTAGCTACAACGA TATATTCA	2343
734	AUAUUAUA A UGUAAAAA	957	CTTTTACA GGCTAGCTACAACGA TUTAATAT	2344
751	CUUCUUUA A UACUAAGU	958	ACTTAGTA GGCTAGCTACAACGA TAAAGGAG	2345

Table 28

775	AGGUCUUC A CCAAGUAA	959	ATACTTGG GGCTAGCTACAACGA GAAGACCT	2346
791	UCAAGUA A UAACACAA	960	TTGTGTTA GGCTAGCTACAACGA TACTTTGA	2347
794	AAGUAAUA A CACAAAG	961	CATTTGTG GGCTAGCTACAACGA TATTACTT	2348
796	GUAUUAAC A CAAUUGAA	962	TTCAATTTG GGCTAGCTACAACGA GTTATTAC	2349
800	UAACACAA A UGAAGUGU	963	ACACTTCA GGCTAGCTACAACGA TTGTGTTA	2350
810	GAAGUGUC A UUAUUCAA	964	TTGAATAA GGCTAGCTACAACGA GACACTTC	2351
820	UAUUCAAA A UAGUCCAC	965	GTGGACTA GGCTAGCTACAACGA TTTGAATA	2352
827	AUAGUCC A CUGACUCC	966	GGAGTCAG GGCTAGCTACAACGA GGACTATT	2353
831	GUCCACUG A CUUCUCAA	967	GTGAGGAG GGCTAGCTACAACGA CAGTGAAC	2354
838	GACUCCUC A CAUCUGUU	968	AACAGATG GGCTAGCTACAACGA GAAGAGTC	2355
840	CUCUCUAC A UCUGUUUA	969	ATAACAGA GGCTAGCTACAACGA GTGAGGAG	2356
862	UAUAAAGA A CUUUUUGU	970	ACAAATAG GGCTAGCTACAACGA TCTTTATA	2357
875	UUGUAGUA A CUAUCAGA	971	TCTGATAG GGCTAGCTACAACGA TACTACAA	2358
884	CUAUCAGA A UCUACAUA	972	AATGTAGA GGCTAGCTACAACGA TCTGATAG	2359
890	GAUUCUAC A UUCUAAAA	973	TCTTAGAA GGCTAGCTACAACGA GTAGATTG	2360
898	AUUCUAAA A CAGAAAUU	974	AATTTCTG GGCTAGCTACAACGA TTTAGAA	2361
904	AAACAGAA A UUGUAUUU	975	AAATACAA GGCTAGCTACAACGA TTCTGTTT	2362
923	UUUAUGCC A CUUUAACA	976	TGTTAATG GGCTAGCTACAACGA GGCATAGA	2363
925	UAUGCCAC A UUAACAUC	977	GATGTTAA GGCTAGCTACAACGA GTGGCATA	2364
929	CCACAUA A CAUCUUUU	978	AAAAGATG GGCTAGCTACAACGA TAATGTGG	2365
931	ACAUAUAC A UCUUUAAA	979	TTAAAAGA GGCTAGCTACAACGA GTTAAATG	2366
945	UAAAGUGU A UGAGAAUC	980	GATTTCTA GGCTAGCTACAACGA CAACTTTA	2367
951	UGAUGAGA A UCAAGUAA	981	ATACTTGA GGCTAGCTACAACGA TCTCATCA	2368
974	GUAAGGCC A UACUCUUA	982	TAAGAGTA GGCTAGCTACAACGA GGCCTTAC	2369
984	ACUCUUA A UAAUAAAA	983	TTTTATTA GGCTAGCTACAACGA GTAAGAGT	2370
987	CUUACAUA A UAAAAUUC	984	GAATTTTA GGCTAGCTACAACGA TATGTAAG	2371
992	AUAAUAAA A UUCUUUUU	985	AAAAGGAA GGCTAGCTACAACGA TTTATTAT	2372
1006	UUUAAGUA A UUUUUUUA	986	TGAAAAAA GGCTAGCTACAACGA TACTTTAA	2373
1019	UUCAAGA A UCAACAGA	987	TTCTGTGA GGCTAGCTACAACGA TCTTTGAA	2374
1022	AAAGAAUC A CAGAAUUC	988	GAATTTCT GGCTAGCTACAACGA GATTTCTT	2375
1027	AUCAACAG A UGUUAGUA	989	TACTAGAA GGCTAGCTACAACGA TCTGTGAT	2376
1037	UUCAGUAC A UUGUGGUA	990	TACTTACA GGCTAGCTACAACGA GTACTAGA	2377
1047	GUAGGUAA A UCAUAAAU	991	ATTTATGA GGCTAGCTACAACGA TTACTTAC	2378
1050	GGUAAUUC A UAAAUUCU	992	CAGATTTA GGCTAGCTACAACGA GATTTACC	2379
1054	AUUCUAAA A UCUGUUUU	993	AGAACAGA GGCTAGCTACAACGA TTTGATTT	2380
1066	GUUCUAAG A CAUUGUUA	994	ATCATATG GGCTAGCTACAACGA CTTAGAAC	2381
1068	UCUAAGAC A UAGUACUA	995	TGATCATA GGCTAGCTACAACGA GTCTTAGA	2382
1073	GACAUUAG A UCAACAGA	996	TCTGTTGA GGCTAGCTACAACGA CATATGTC	2383
1077	UAUGAUCA A CAGAUUGA	997	CTCATCTG GGCTAGCTACAACGA TGATCATA	2384
1081	AUCAACAG A UGAGAAUC	998	AGTTCTCA GGCTAGCTACAACGA CTGTTGAT	2385
1087	AUAUGAGA A CUGUGUGU	999	ACCACGAG GGCTAGCTACAACGA GTACTACT	2386
1098	GGUGGUUA A UAUUGUAG	1000	GTCACATA GGCTAGCTACAACGA TAACACCC	2387
1105	AAUUGUGU A CAGUGAGA	1001	TCTCACTG GGCTAGCTACAACGA CACATATT	2388
1113	ACAGUGAG A UUAUGUUA	1002	ATGACTAA GGCTAGCTACAACGA CTCACTGT	2389
1120	GAUUAUUC A UAUACUA	1003	TAGTGATA GGCTAGCTACAACGA GACTAATC	2390
1125	GCUAAUUC A UAAUUAUA	1004	TATATTAG GGCTAGCTACAACGA GATATGAC	2391
1129	UAUCACUA A UAUACUAA	1005	TTAGTATA GGCTAGCTACAACGA TAGTGATA	2392

Table 28

1137	AUAUACUA	A	CAACAGAA	1006	TTCTGTTG	GGCTAGCTACAACGA	TAGTATAT	2393
1140	UACUAAAC	A	CAGAAUUC	1007	AGATTCTG	GGCTAGCTACAACGA	TGTATAGTA	2394
1145	ACAAACAGA	A	UCUUAUUC	1008	AGATTAGA	GGCTAGCTACAACGA	TCTGTTGT	2395
1150	AGAUCUUA	A	UCUUAUUC	1009	AATGAAGA	GGCTAGCTACAACGA	TAGATTCT	2396
1156	UUAUUCUUC	A	UUUUAAGC	1010	GCCTTAAA	GGCTAGCTACAACGA	GAAAGATTA	2397
1165	UUUUAAGC	A	CUGUAGUG	1011	CACACAGG	GGCTAGCTACAACGA	GCCTTAAA	2398
1175	UGUAGUGA	A	UUUUCUGA	1012	TCAGATAA	GGCTAGCTACAACGA	TCACTACA	2399
1205	AGCUUACC	A	UACUUAU	1013	ATATAGTA	GGCTAGCTACAACGA	GGTAAGCT	2400
1221	UCUUGUGA	A	CAUGAAGA	1014	TTTCATGA	GGCTAGCTACAACGA	TCCAAGA	2401
1224	UUGGAUUC	A	UGAAACCU	1015	AGGTTTCA	GGCTAGCTACAACGA	GATTCCAA	2402
1229	AUCAUGAA	A	CCUUAAGA	1016	TCCTTAAG	GGCTAGCTACAACGA	TTTCATGAT	2403
1237	ACCUUAAG	A	CUUCAGAA	1017	TTCTGAAG	GGCTAGCTACAACGA	CTTAAGGT	2404
1245	ACUUCAGA	A	UGAUUUUG	1018	CAAAATCA	GGCTAGCTACAACGA	TCTGAAGT	2405
1248	UCAGAAU	A	UUUUGCAG	1019	CTGCAAAA	GGCTAGCTACAACGA	CATTCTGA	2406
1267	UUCUUUCC	A	UUCCAGCC	1020	GGCTGGAA	GGCTAGCTACAACGA	GGAAGACA	2407
1278	CCAGCCUA	A	CAUCCAUA	1021	ATTGGATG	GGCTAGCTACAACGA	TAGGCTGG	2408
1280	AGCCUUAAC	A	UCCAAUUC	1022	GCATTGGA	GGCTAGCTACAACGA	GTTAGGCT	2409
1285	AACAUCCA	A	UGCCAGCA	1023	TGCTCGCA	GGCTAGCTACAACGA	TGATGTGT	2410
1300	CAAGGAAA	A	UAAAGAGA	1024	ATCTTTTA	GGCTAGCTACAACGA	TTTCCTTG	2411
1307	AAUAAAAG	A	UUUCCAGU	1025	ACTGGAAA	GGCTAGCTACAACGA	CTTTTATT	2412
1317	UUCGAGUG	A	CAGAAAAA	1026	TTTTTCTG	GGCTAGCTACAACGA	CACCTGGA	2413
1325	ACAGAAAA	A	UAUAUUUA	1027	ATAATATA	GGCTAGCTACAACGA	TTTCTGTG	2414
1352	UUUAAAAA	A	UAUAUGAA	1028	TTTATATA	GGCTAGCTACAACGA	TTTTAAAA	2415
1360	AUAUAUGA	A	UUCUCUCU	1029	AGAGAGAA	GGCTAGCTACAACGA	TCATATAT	2416
1373	CCUCUCAA	A	UAUUAACU	1030	AGTTAATA	GGCTAGCTACAACGA	TTGGAGAG	2417
1379	AUAUAUUA	A	CAUAUUUU	1031	ATAATTAG	GGCTAGCTACAACGA	TAATATTT	2418
1383	AUTAAACUA	A	UAUAUAGA	1032	TCTAATAA	GGCTAGCTACAACGA	TAGTTAAT	2419
1391	AUAUAUAG	A	UAUAUUUG	1033	AAATATAA	GGCTAGCTACAACGA	CTAATAAT	2420
1404	AUUUUGAA	A	UGAACUUG	1034	CAAGTTCA	GGCTAGCTACAACGA	TTCAAAAT	2421
1408	UGAAUAUGA	A	CUUGUUGG	1035	CCAACAAG	GGCTAGCTACAACGA	TCATTTCA	2422
1420	GUUGGCCC	A	UCUAUUAC	1036	GTAATAGA	GGCTAGCTACAACGA	GGGCCAAC	2423
1429	UUUAUUAC	A	UCUACAGC	1037	GCTGTAGA	GGCTAGCTACAACGA	GTAATAGA	2424
1440	UACAGCUG	A	CCUUGGAA	1038	TTCAAGGG	GGCTAGCTACAACGA	CAGCTGTA	2425
1448	ACCCUUGA	A	CAUGGGGG	1039	CCCCCATG	GGCTAGCTACAACGA	TCAAGGGT	2426
1450	CCUUGAAC	A	UGGGGGUU	1040	AACCCCCA	GGCTAGCTACAACGA	GTTCAAGG	2427
1469	GGAGCUG	A	CAUUCUUG	1041	ACGAATTG	GGCTAGCTACAACGA	CAGCTCCC	2428
1472	AGCUGACA	A	UUGUGGGG	1042	CCCCAGAA	GGCTAGCTACAACGA	TGTCAGCT	2429
1489	UUCGCAAA	A	UCUUAACU	1043	AGTTAAGA	GGCTAGCTACAACGA	TTGCGGA	2430
1495	AAUUCUUA	A	CUACCUAA	1044	TTAGGCTAG	GGCTAGCTACAACGA	TAAATATT	2431
1503	ACUACCUA	A	UAGCCUAC	1045	GTAGGCTA	GGCTAGCTACAACGA	TAGGTAGT	2432
1517	UACUAUUG	A	CCAUAAAC	1046	GTTTATGG	GGCTAGCTACAACGA	CAATAGTA	2433
1520	UAUUGACC	A	UAUACCUU	1047	AAGGTTTA	GGCTAGCTACAACGA	GGTCAATA	2434
1524	GACCAUAA	A	CCUUCACG	1048	CAGTAAGG	GGCTAGCTACAACGA	TTATGGTC	2435
1533	CCUUCACU	A	UAACAUAU	1049	TTATGTTA	GGCTAGCTACAACGA	CAGTAAGG	2436
1536	UACUGAUA	A	CAUAAACA	1050	TGTTTATG	GGCTAGCTACAACGA	TATCAGTA	2437
1538	CUGAUUAC	A	UAAACAGU	1051	ACTGTTTA	GGCTAGCTACAACGA	GTTATCAG	2438
1542	UAACAUAU	A	CAGUAAAU	1052	ATTACTG	GGCTAGCTACAACGA	TTATGTTA	2439

Table 28

1549	AACAGUAA A UUAACACA	1053	TGTGTTAA GGCTAGCTACAACGA TTACTGTT	2440
1553	GUAAAUUA A CACAUUUU	1054	AATATGTG GGCTAGCTACAACGA TAATTTAC	2441
1555	AAAUUAA C CAUUAUUU	1055	AAATATG GGCTAGCTACAACGA GTTAATTT	2442
1557	AUUUACAC A UUUUUUC	1056	GCAAAATA GGCTAGCTACAACGA GGTATAAT	2443
1584	UAUUUAC A CUUUUUUC	1057	GAATATAG GGCTAGCTACAACGA GTATAATA	2444
1598	UUCUACA A UAAAGUAA	1058	TTACTTTA GGCTAGCTACAACGA TGTAGGAA	2445
1617	UAGAGAAA A UGUUUUUU	1059	AAATAACA GGCTAGCTACAACGA TTTCTCTA	2446

Input Sequence = PLN. Cut Site = R/Y

Stem Length = 8. Core Sequence = GGCTAGCTACAACGA

PLN (Homo sapiens phospholamban (PLN) mRNA; 1635 bp)

Table 29

Table 29: Human Phospholamban (PLN) amberzyme Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
64	UCUAUACU G UGUAGUC	732	GAUCAUCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGUAUAGA	2447
66	UUAUCUAGU G AUGAUCAC	733	GUAUAUCA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG ACAGUAUA	2448
69	ACUGUAGU G AUGACAGC	734	GUUGUAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AUCAACGU	2449
79	UCACAGCU G CAGAGGCU	735	AGCUUUGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGCUGUGA	2450
121	UAUGGGCU G CGAGUCU	736	AAAGCUUGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGCCAAUA	2451
143	UUUUCUCU G ACCACTUA	737	UAAUGUGGU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG GAGAGAAA	2452
168	GACUCCCU G UGCIFGUG	738	CAGCAGGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGGAAGUC	2453
173	CCUGUCU G CUGAGUUC	739	GUUACCGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGGACAGG	2454
207	CCUCACUC G CUCAGCUA	740	UAGCUGAG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG GAGUGAGG	2455
236	CACCAUUG G AAAGUCU	741	AGGCUAUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AAUGUUG	2456
241	AUUGAAAU G CUCUACCA	742	UUUUGAGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AUUUCUAU	2457
288	CANUUUCU G UUCUAUCU	743	AGAUGAGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGMANUUG	2458
303	CUUAUAU G UCUUUGUC	744	GCUAGAGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AUUUAUAG	2459
310	UUUCUCUU G CUGAUCUG	745	CAUAUCNG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGAGACA	2460
313	GUUGAUCU G UAUCAUCG	747	AUUCAGAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGCUAGAG	2461
318	AUCAGUCU G AUGUUCU	748	CGAUGAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAUCAGC	2462
328	AUCUGUUCU G AUGUUCU	749	AGNAGCAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAUCAGU	2463
331	AUCUGUAGU G CUCUCUCU	750	CAGAGGAG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAAGAGC	2464
339	GUUUCUCU G AAGUUCUG	751	CAGAACTU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAAGAGC	2465
347	GAUUCUCU G CUCUACCC	752	GGUUGUAG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAUAUUC	2466
365	CUGAUCU G CAGCUGUC	753	GCNAGCUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAUCUAG	2467
372	UFCAGUCU G CCACAUCA	754	UGAUGUUG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGUCUGA	2468
392	UUAUAUCU G UCAUCCCA	755	UGGUAUGA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAUUUA	2469
402	CAUCCCAU G CAGACGAG	756	CCUUCUGG GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AUUGGAUG	2470
422	ACAAUAU G UUAUAACG	757	CUGUUAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AAUAUUGU	2471
441	CACUUCU G AUGAGGAG	758	CUUCUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AGUAUGUG	2472
459	GUUUCUUU G UGAAGAGG	759	CCUUUAUA GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG AAAGAAAC	2473
461	UUUUCUUU G AAAGAGUC	759	GACUUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGGG ACAAGAUA	2474

Table 29

492	AACUUAU G UAACAAU	760	UAUGUUA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAAGU	2475
502	UAACAAU G UAUAUAC	761	GAUGAAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUGUA	2476
512	AUAUAU G UUGUAU	762	AGAUCAA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2477
522	UGUAU G UAUAACU	763	CAUUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUCAA	2478
530	GUAAACU G AUAAGGC	764	GCUUUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUUAUAC	2479
570	AAUAAGU G UAUAUAU	765	AUAUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG ACUAUAU	2480
579	UAUAUAU G CAUAUUA	766	ACAUUUG GGAGAAACUCC CU UCAGGACAUUCUCCGG AUUAUAU	2481
585	AGUAUAU G UUAUAU	767	GAUAUUA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUUGAU	2482
588	CAUAUAU G AUUAUUA	768	GAGUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG ACAGUAU	2483
633	UCUAUAU G AUAUAUA	769	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAUA	2484
660	UAUAUAU G CAUAUAU	770	AAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AUUAUAU	2485
665	ACUAUAU G CAUAUAU	771	UGUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAUA	2486
710	ACUAUAU G AGUAUAU	772	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2487
715	UAUAUAU G AUAUAUA	773	AUAUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2488
736	AUAUAUA G UAUAUAU	774	AGUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2489
802	ACUAUAU G AUAUAUA	775	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2490
807	AUAUAUA G UAUAUAU	776	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2491
830	AGUAUAU G UAUAUAU	777	AUAUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2492
844	UAUAUAU G UAUAUAU	778	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2493
869	UAUAUAU G UAUAUAU	779	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2494
907	UAUAUAU G UAUAUAU	780	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2495
920	UAUAUAU G UAUAUAU	781	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2496
944	UAUAUAU G UAUAUAU	782	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2497
947	UAUAUAU G UAUAUAU	783	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2498
1039	UAUAUAU G UAUAUAU	784	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2499
1058	UAUAUAU G UAUAUAU	785	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2500
1072	UAUAUAU G UAUAUAU	786	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2501
1083	UAUAUAU G UAUAUAU	787	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2502
1102	UAUAUAU G UAUAUAU	788	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2503
1104	UAUAUAU G UAUAUAU	789	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2504
	UAUAUAU G UAUAUAU	790	UAUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUAUAU	2505

Table 29

1110	GGGACAGU G AGATUAGU	791	ACUUAUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG ACUUCUAC	2506
1168	AAGGACU G UAGUGAAU	792	ATUCACUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AGUUCUCCU	2507
1173	ACUUGAGU G AAUUAUCU	793	AGUUAUUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG ACUUAUAGU	2508
1182	AAUUAUCU G AGCUNAGA	794	CUCUUAUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AGUUAUUCU	2509
1226	GGAAUACU G AAACUUA	795	UAAGUUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUGAUUCC	2510
1247	UUCAGAAU G AUUUUCCA	796	UUCUAAAU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUCUGAA	2511
1253	AGUUAUUCU G CAGGUUUU	797	ACUACUCC GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAUAUUA	2512
1260	UGCAGUUU G UCUUCUUA	798	AUGAAGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AACUCUA	2513
1287	CAUCCAAU G CAGGCGAG	799	CUUCCUUG GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUGAUG	2514
1316	UUUCCAGU G ACNRAAA	800	UUUUUCCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG ACUGBAAA	2515
1358	AAUUAUUCU G AAUUCUCU	801	AGAGAAUUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUAUUAU	2516
1401	UAUUAUUU G AAUUGAAC	802	GUUCUUAU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAUAUUA	2517
1406	UUUGAAAU G AAUUCUUU	803	AAUUAUUCU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUUCUAA	2518
1412	AUGAACUUCU G UUUGCCCA	804	UGGUCCAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAGUUCUAG	2519
1439	CUACAGUUCU G ACCUUGUA	805	UCAGAGUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AGCUUAG	2520
1446	UGAACCCUUCU G AACAUUGG	806	CCUUAUUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAGGUGUA	2521
1468	GGGAGACU G ACMAUUGG	807	CGAUUUUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AGUUCUCC	2522
1484	GUUGGUUCC G CAUAUUCU	808	AGAUUUUG GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG GAGUCCAC	2523
1516	CUACUUAUUCU G ACCUUAUA	809	UUUAUUUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAUUAUG	2524
1532	ACCUUAUUCU G AUUAUUAU	810	UAUUUUUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AGUUAUGU	2525
1564	CAUUAUUU G CUUUUUUU	811	AUAACACG GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AAUAUUG	2526
1568	UUUUUUUU G UUUAUUGU	812	ACUUAUUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG ACUCUAAA	2527
1575	UGUUUAUU G UUUAUUAU	813	GUUAUUAU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUAUUA	2528
1619	GAGAAUUCU G UUUAUUG	814	CUAAUUAU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG AUUUUUUC	2529
21	ACUCCUCCCA G CUAAUAC	815	GUUUUUUU GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG UUGUGUUU	2530
32	AAACACCCU G UUAUUAUC	816	AAGUUAUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG GUGUUUUU	2531
76	UGUUAUUA G CUUGCAG	817	CUUGCAG GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG UGUUAUA	2532
85	CUUGCAG G CUUCCUUA	818	UUAGUUUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG CUUGCAG	2533
103	AGAGACUA G UUAUUAUC	819	UUAUAUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG UGUUUUUU	2534
118	CAUUAUUU G CUUGCAG	820	GUUGCAG GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG CAUAUUG	2535
125	GGUCCUCCA G CUUUUUUU	821	AUAUAUUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGGG UUGUCC	2536

Table 29

177	UCCUGCUG G UAUCAUGG	822	CCAUGAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG CAGCAGGA	2537
191	UGAGAA G UCAUAUC	823	GUUUGGA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUCUCCA	2538
212	CUCCUCCA G CUUUNAGA	824	UCUUAUG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UGAGCAGG	2539
224	UAGAAGA G CUUUAACC	825	GUUGAGG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UCUUUAUA	2540
251	CUACAGA G CACUGAAC	826	UUGACUGG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUUGAG	2541
255	ACAGAC G UCAAAAGC	827	GCUUUGA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG GUGUGUGU	2542
262	CUCAAAA G CUACAGAA	828	UUUUGUAG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAGCG	2543
326	GUUAUC G UGAUGGUU	829	AAGCAUGA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG GAUAUAUC	2544
342	UCUUGAA G UUUUCUUA	830	UGACAGAA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUCAGAGA	2545
368	GAUCGCA G CUUGCCAC	831	UGGCAAG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UGCAGAUC	2546
381	CCACAU G CUUAAAU	832	AUUUAAG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UGAUUGUG	2547
443	CUUCUGA G UAGAAGG	833	CUUUUUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UCAAGGAG	2548
451	GUAGAGA G UUUUUUG	834	CAAGGAA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UCUUCUAC	2549
467	GUAAAG G UCAAGAUU	835	AAUCUGA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG CUUUUAC	2550
537	UGAAAGG G CUUAUUU	836	AAUUAAG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG CCUUUUA	2551
568	CAAAUA G UGUUAAA	837	UUUAUACA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUAUUUUG	2552
603	UCACAG G CUACAAA	838	UUUGUG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UCUUUAUA	2553
644	GAUGAGA G UUAUGUU	839	AAACUAAA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UCUUUAUC	2554
649	AGAGUUA G UUUUAAA	840	UUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUAACUUC	2555
673	GCACAA G UUCACUUC	841	GAUGUAA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUUGGC	2556
691	UAUUAUA G CAUUUUU	842	AAUUAUG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUA	2557
713	CUUUUGA G UGAUUA	843	UAUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG CUUAAAAG	2558
742	AUGUAAA G CUUUUUA	844	UAAAGAG GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2559
768	AUAUUA G UAUUUUUC	845	GUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUAUUUU	2560
769	UUUUUAG G UCUUACG	846	CUUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUGUUA	2561
780	UUUACCAA G UUAUAAA	847	UUUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2562
788	GUUAUUA G UBAUUAUA	848	UUUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2563
805	CAAAUUA G UGUUUAUA	849	UUAUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2564
823	UAAAUUA G UCCAUUA	850	UUAUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2565
872	UUUUUUA G UBAUUAUC	851	GAUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUAUUAUA	2566
941	CUUUUUA G UGUUAGG	852	CUUUAUA GGAGGAAACUCC CU UCAAGGACAUUGUCUGGG UUUUAUAU	2567

Table 29

956	AGAAUCAA G UAUGGAA	853	UUUCUUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUUCU	2568
966	AUGGAAAA G UAUGGCAA	854	UGGCUUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUUUUCU	2569
971	AAAGUAG G CCUAUC	855	GAUAUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUAUCUU	2570
1003	CCUUUUA G UUAUAUUA	856	AAUAUUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAAGU	2571
1033	GAUAUUA G UCAUAUUA	857	UUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UAGAUAUC	2572
1043	ACUAUUG G UUAUUAU	858	AUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUAUAUC	2573
1091	GAGAACTG G UGUUAUUG	859	AUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUAUAUC	2574
1094	AAUUAUG G UUAUAUUG	860	UUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CAGUAUC	2575
1108	AUGUAGA G UGAUAUA	861	CAUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CACCAUUC	2576
1117	UGAGUAU G UCAUAUUA	862	UUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUA	2577
1163	CAUUAAG G CACUAUAG	863	CUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUAUAUG	2578
1171	GCUAUGA G UGAUAUA	864	AUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2579
1184	UAUAUUA G CUUAUAU	865	AAUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2580
1190	GACUAUA G UAUAUUA	866	CUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2581
1198	CUUAUUA G CUUAUAU	867	AUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2582
1257	UUUUAUG G UGUUAUUC	868	GAUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2583
1273	CCUAUUA G CCUAUAU	869	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2584
1291	CUUAUUA G CAUAUAU	870	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2585
1314	GAUAUAUA G UGAUAUA	871	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2586
1339	UAUAUAUA G UUAUAUA	872	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2587
1416	AAUAUAUA G UGAUAUA	873	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2588
1436	AAUAUAUA G UGAUAUA	874	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2589
1456	AAUAUAUA G UGAUAUA	875	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2590
1465	AAUAUAUA G UGAUAUA	876	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2591
1476	AAUAUAUA G UGAUAUA	877	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2592
1480	AAUAUAUA G UGAUAUA	878	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2593
1506	AAUAUAUA G UGAUAUA	879	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2594
1545	AAUAUAUA G UGAUAUA	880	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2595
1566	AAUAUAUA G UGAUAUA	881	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2596
1603	AAUAUAUA G UGAUAUA	882	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2597
1607	AAUAUAUA G UGAUAUA	883	UUUAUAUA GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUAUC	2598

Table 29

9	CAGAGUUA G AAGAACUC	1060	GGAGUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGACUUG	2599
36	ACCGGUAA G ACUUAUA	1061	UAUGAAUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGACGUG	2600
84	GUUGCAA G GUACUUA	1062	UAGUAGC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUGGACG	2601
96	ACUUAAGA G AAGACAA	1063	ACUGUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUAGU	2602
99	UAAAGAA G ACAGUAA	1064	AUAACUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUUUA	2603
117	UCUUAUU G GUUGCAG	1065	CUUGGAC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG AAUAUA	2604
160	AAACUUA G ACUUCUAG	1066	CAGAAUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGAAUUU	2605
176	GUUCUCU G GUUUAUG	1067	CAUGAUUC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG AGCAGAC	2606
184	GUUAUUG G GAGAAAU	1068	ACUUUCU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGUAUAC	2607
185	GUUAUUG G AGAAGUC	1069	GACUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG CAUGUAC	2608
187	AUAUGA G AAGUCCA	1070	UGGACUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUAUAGU	2609
219	AGUUAUA G AAGAGCU	1071	AGGUCUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUAUAGU	2610
222	UAUAGAA G AGCUCAA	1072	UGAGGCU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUCUUAU	2611
268	AAGCUUA G AUUCUAG	1073	AUAAGUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGUAAGU	2612
360	AACCUUA G AUUGCAG	1074	CUAGCAU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UAGAGUU	2613
405	CGAUGCA G ACGGAAA	1075	UUUCUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGCAUGG	2614
409	UGAGACA G GAAAGAA	1076	UUUUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UGUUUGA	2615
410	GGAGACG G AAACAAU	1077	AUUUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG CUUUUUC	2616
430	GUUUAUA G ACUACUC	1078	GAUUUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUAUC	2617
446	CUUAGUA G AAGAUUU	1079	AAACUUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UACUAGG	2618
449	AGUAGAA G AGUUUUU	1080	AGAAACU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUACU	2619
466	UGUAAA G GUUAGAU	1081	AUCUAGC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUACA	2620
472	AAGUCAA G AUUAGAC	1082	GUUUUAU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUGACUU	2621
478	AGAUUAA G ACUAAAC	1083	GUUUUAU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUAUACU	2622
515	CAUCUUU G GAUCUUU	1084	ACAGAUU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG AGAGAGU	2623
516	AUCUUUG G AUUUUGA	1085	UACAAGU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG CAAAGAU	2624
535	CAUGAAA G GCUUUUA	1086	AUAAGUC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUUUUAU	2625
536	AUAAGAA G GCUUAUU	1087	AUAAGUC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG CUUUUAU	2626
602	CUAACAU G GCUCAUA	1088	UUUGAGC GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG AUUUUAG	2627
636	UUUCGAA G AUAGAG	1089	CUUUUAU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUGACAA	2628
642	AAGUAAA G AGUUUAG	1090	ACUUAACU GGAGGAAACUUC CU UCAGAGACAUUCUCCCGG UUAUCUU	2629

Table 29

712	UCUUIUGA G GUGAUU	1091	AUUIUAC GGAGAAACUCC CU UCAGGACAUUCUCCGG UCAAAAGA	2630
768	AUIUIUGA G GUUCUAC	1092	GUAGAGC GGAGGAAACUCC CU UCAGGACAUUCUCCGG UCAAAAU	2631
860	AUIUAUA G AUIUAUU	1093	AUIUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUIUAU	2632
882	AUIUAUA G AUIUAUA	1094	UUGUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGUAUU	2633
901	CUAAACA G AAUIUGA	1095	UACAUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGUUUAG	2634
949	GUUGUGA G AUACUUG	1096	ACUUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGACUAC	2635
960	CAAGUAU G GAAGUA	1097	UAUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG AUACUGA	2636
961	CAAGUAU G GAAGUA	1098	UAUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG CAUACUG	2637
970	AAAGUA G GCUUAU	1099	AGUAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAUUUU	2638
1017	UUUUUUA G AUUCUAG	1100	CUUGUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUAAA	2639
1025	GAUACA G AUUUUAG	1101	CUAGUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUAUU	2640
1042	UACUUGA G GUUAUA	1102	UGAUUAC GGAGAAACUCC CU UCAGGACAUUCUCCGG UACAUUA	2641
1065	UGUUUUA G ACUAUUA	1103	UCAUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGAACA	2642
1080	GAUACA G AUGGAAC	1104	GUUUUUA GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUAUC	2643
1085	ACGAUGA G ACUUGUG	1105	CACCAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGACUUU	2644
1090	UGAGUAU G GUUUUUA	1106	UUAACAC GGAGAAACUCC CU UCAGGACAUUCUCCGG AGUUCUA	2645
1093	GAUCUGU G GUUAUA	1107	AUIUAAC GGAGAAACUCC CU UCAGGACAUUCUCCGG ACCAGUC	2646
1112	GAUGUGA G AUUAUGA	1108	UGAUUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGACUUC	2647
1143	UUAACA G AUUAUA	1109	AUIUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUUUUA	2648
1162	UUAUUUA G GCACUUA	1110	UACAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAUUUA	2649
1188	CUAGUGA G AGUUAUU	1111	AGUAUAC GGAGAAACUCC CU UCAGGACAUUCUCCGG UAGUUCG	2650
1218	AUUCUUU G GAUUAUG	1112	CAUUAUC GGAGAAACUCC CU UCAGGACAUUCUCCGG AAGAUUA	2651
1219	UAUCUUU G AUUAUGA	1113	UCAUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAUUUA	2652
1236	AACUUA G ACUUCAG	1114	UCUAAGU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAAGUU	2653
1243	AGUUCUA G AUUAUUU	1115	AUAUAUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAUUUU	2654
1256	AUIUUUGA G GUUUUUU	1116	AGACAAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGCAAAU	2655
1290	CAUAUGA G GCAGUA	1117	UUUUUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UGCAUUG	2656
1295	CGAGUUA G GAUAUA	1118	UUUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUUUC	2657
1296	CAGCAGG G AAUAUUA	1119	UUUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUUUC	2658
1306	AAUAUUA G AUUUUAG	1120	CUAGAAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUUUUU	2659
1320	CAGUGUA G AAAAUUU	1121	AUUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUGUUCG	2660

Table 29

1390	AAUUAUA G AUUAUUU	1122	AAUUAUAU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAUAAUUAU	2661
1415	AACTUGUU G GCCAUCU	1123	AGAUGGAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AACAAUUU	2662
1452	UUGAACUU G GGGUUAG	1124	CUAACCCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AUGUUCNA	2663
1453	UGAACAU G GGGUAGG	1125	CCUAAACC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CAUUDCA	2664
1454	GAACNUG G GGUUAGG	1126	CCCUAAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CCAUUDUC	2665
1455	AACAUGG G GUUAGGG	1127	CCCUAAC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CCAUUDUC	2666
1460	GGGGUUA G GGGAGCU	1128	CAGCUCCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAAACCCC	2667
1461	GGGUUAG G GGAGCUGA	1129	UCAGCUCC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUAACCCC	2668
1462	GGUUAGG G GAGCUGAC	1130	GUACGUCU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUAACCCC	2669
1463	GUUUAGG G AGCUGCA	1131	UUUCAGCU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CUAACCCC	2670
1478	CAUUCGU G GUUCGCA	1132	UUGCGACC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG AGCAUUG	2671
1479	AUUUCUG G GUUCGCA	1133	UUGCGACC GGAGGAAACUCC CU UCAAGGACAUUCUCCGG CCAUUAU	2672
1611	GUAGGUA G AGAAAUU	1134	CAUUDUCU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAGCUUAC	2673
1613	AAGCUGA G AAAAUUU	1135	AACAUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUAGUU	2674
1627	GUUAUUA G AAAAUCAU	1136	AUGAUUUU GGAGGAAACUCC CU UCAAGGACAUUCUCCGG UAAUUUAC	2675

Input Sequence = PLN. Cut Site = G/.

Stem Length = 8. Core Sequence = GGAGGAAACUCC CU UCAAGGACAUUCUCCGG

PLN (Homo sapiens phospholamban (PLN) mRNA; 1635 bp)

Table 30

Table 30: Human Phospholamban (PLN) Antisense and Target Sequence

Pos	Target	Seq ID	Antisense	AS Seq ID
1	CAGAGUCAGAAAAUCUCCAGCUAA	2447	TTAGCTGGGGAGTTTCTGACTCTG	3051
2	AGAGUCAGAAAAUCUCCAGCUAA	2448	TTAGCTGGGGAGTTTCTGACTCT	3052
3	GAGUCAGAAAAUCUCCAGCUAAAC	2449	GTTTAGCTGGGGAGTTTCTGACTC	3053
4	AGUCAGAAAAUCUCCAGCUAAACA	2450	TGTTAGCTGGGGAGTTTCTGACT	3054
5	GUCAGAAAAUCUCCAGCUAAACAC	2451	GTGTTAGCTGGGGAGTTTCTGAC	3055
6	UCAGAAAAUCUCCAGCUAAACACC	2452	GGTGTTTAGCTGGGGAGTTTCTGA	3056
7	CAGAAAAUCUCCAGCUAAACACCC	2453	GGGTGTTTAGCTGGGGAGTTTCTG	3057
8	AGAAAAUCUCCAGCUAAACACCCG	2454	CGGGTGTTAGCTGGGGAGTTTCT	3058
9	GAAAAUCUCCAGCUAAACACCCGU	2455	ACGGGTGTTTAGCTGGGGAGTTTC	3059
10	AAAAUCUCCAGCUAAACACCCGUA	2456	TACGGGTGTTTAGCTGGGGAGTTT	3060
11	AAACUCUCCAGCUAAACACCCGUAA	2457	TTACGGGTGTTTAGCTGGGGAGTT	3061
12	AAUCUCCAGCUAAACACCCGUAAAG	2458	CTTACGGGTGTTTAGCTGGGGAGTT	3062
13	ACUCCUCCAGCUAAACACCCGUAAAG	2459	TCTTACGGGTGTTTAGCTGGGGAGT	3063
14	CUCCUCCAGCUAAACACCCGUAAAG	2460	GTCTTACGGGTGTTTAGCTGGGGAG	3064
15	UCCUCCAGCUAAACACCCGUAAAGACU	2461	AGCTTACGGGTGTTTAGCTGGGGAG	3065
16	CCUCCAGCUAAACACCCGUAAAGACU	2462	AAGCTTACGGGTGTTTAGCTGGGGAG	3066
17	CCUCCAGCUAAACACCCGUAAAGACU	2463	GAACTTACGGGTGTTTAGCTGGGGAG	3067
18	CCUCCAGCUAAACACCCGUAAAGACU	2464	TGAAGCTTACGGGTGTTTAGCTGGGGAG	3068
19	CAGCUAAACACCCGUAAAGACU	2465	ATGAAGCTTACGGGTGTTTAGCTGGGGAG	3069
20	AGCUAAACACCCGUAAAGACU	2466	TATGAAGCTTACGGGTGTTTAGCTGGGGAG	3070
21	GCUAACACCCGUAAAGACU	2467	GATGAAGCTTACGGGTGTTTAGCTGGGGAG	3071
22	CUAAACACCCGUAAAGACU	2468	TGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3072
23	UAAACACCCGUAAAGACU	2469	TTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3073
24	AAACACCCGUAAAGACU	2470	GTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3074
25	AACACCCGUAAAGACU	2471	TGTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3075
26	ACACCCGUAAAGACU	2472	GTGTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3076
27	CACCCGUAAAGACU	2473	TGTGTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3077
28	ACCCGUAAAGACU	2474	TGTGTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3078
29	CCCGUAAAGACU	2475	ATTGTGTTGTATGAAGCTTACGGGTGTTTAGCTGGGGAG	3079
63	UGUAGUACACAGCUGCCAAAGGCUA	2476	AGCCTTGGCAGCTGTGATCATCAC	3080
64	GUGAUGUACACAGCUGCCAAAGGCUA	2477	TAGCCTTGGCAGCTGTGATCATCAC	3081
65	UGAUGUACACAGCUGCCAAAGGCUA	2478	TAGCCTTGGCAGCTGTGATCATCAC	3082
66	GAUGAUGUACACAGCUGCCAAAGGCUA	2479	GGTAGCCTTGGCAGCTGTGATCATC	3083
67	AUGAUGUACACAGCUGCCAAAGGCUA	2480	AGGTAGCCTTGGCAGCTGTGATCATC	3084
68	UGAUGUACACAGCUGCCAAAGGCUA	2481	TAGGTAGCCTTGGCAGCTGTGATCATC	3085
69	GAUGAUGUACACAGCUGCCAAAGGCUA	2482	TTAGGTAGCCTTGGCAGCTGTGATCATC	3086
70	AUGAUGUACACAGCUGCCAAAGGCUA	2483	TTTAGGTAGCCTTGGCAGCTGTGATCATC	3087
71	UCACAGCUGCCAAAGGCUA	2484	TTTTAGGTAGCCTTGGCAGCTGTGATCATC	3088
72	CACAGCUGCCAAAGGCUA	2485	TTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3089
73	ACAGCUGCCAAAGGCUA	2486	TCTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3090
74	CAGCUGCCAAAGGCUA	2487	TCTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3091
75	AGCUGCCAAAGGCUA	2488	CTTCTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3092
76	GCUGCCAAAGGCUA	2489	TCTCTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3093
77	CUGCCAAAGGCUA	2490	GTCTTCTTTTAGGTAGCCTTGGCAGCTGTGATCATC	3094

Table 30

78	UGCCAAAGGCUACCUAAAAAGAGACA	2491	TGTCCTCTTTTAGGTAGCCTTGCA	3095
79	GCCAAAGGCUACCUAAAAAGAGACAG	2492	CTGCTCTCTTTTAGGTAGCCTTGGC	3096
80	CCAAGGCUACCUAAAAAGAGACAGU	2493	ACTGCTCTCTTTTAGGTAGCCTTGG	3097
81	CAAGGCUACCUAAAAAGAGACAGUU	2494	AACTGCTCTCTTTTAGGTAGCCTTGG	3098
98	AGACAGUUUACUCUAUUUUGGCUGC	2495	GCAGCCAAATATGAGATAACTGTCT	3099
99	GACAGUUUACUCUAUUUUGGCUGCC	2496	GGCAGCCAAATATGAGATAACTGTCT	3100
100	ACAGUUUACUCUAUUUUGGCUGCCA	2497	TGGCAGCCAAATATGAGATAACTGT	3101
101	CAGUUUACUCUAUUUUGGCUGCCAG	2498	CTGGCAGCCAAATATGAGATAACTG	3102
102	AGUUUACUCUAUUUUGGCUGCCAGC	2499	GCTGGCAGCCAAATATGAGATAACT	3103
103	GUUUUACUCUAUUUUGGCUGCCAGCU	2500	AGCTGGCAGCCAAATATGAGATAAC	3104
104	UUUUUACUCUAUUUUGGCUGCCAGCUU	2501	AAGCTGGCAGCCAAATATGAGATAA	3105
105	UAUUUACUCUAUUUUGGCUGCCAGCUU	2502	AAAGCTGGCAGCCAAATATGAGATA	3106
106	AUCUAUUUUGGCUGCCAGCUGUUU	2503	AAAAGCTGGCAGCCAAATATGAGAT	3107
107	UCUCAUUUUGGCUGCCAGCUGUUU	2504	AAAAAGCTGGCAGCCAAATATGAGA	3108
108	CCUAUUUUGGCUGCCAGCUGUUUUU	2505	TAAAAGCTGGCAGCCAAATATGAG	3109
109	UCUAUUUUGGCUGCCAGCUGUUUUU	2506	ATAAAAAGCTGGCAGCCAAATATGAG	3110
110	CAUAUUUUGGCUGCCAGCUGUUUUU	2507	GATAAAAAGCTGGCAGCCAAATATG	3111
111	AUAUUUUGGCUGCCAGCUGUUUUU	2508	AGATAAAAAGCTGGCAGCCAAATAT	3112
112	UAUUUUGGCUGCCAGCUGUUUUU	2509	AAGATAAAAAGCTGGCAGCCAAATAT	3113
113	AUUUUGGCUGCCAGCUGUUUUU	2510	AAAGATAAAAAGCTGGCAGCCAAAT	3114
114	UUUUGGCUGCCAGCUGUUUUU	2511	GAAAGATAAAAAGCTGGCAGCCAA	3115
115	UUUGGCUGCCAGCUGUUUUU	2512	AGAAAGATAAAAAGCTGGCAGCCAA	3116
116	UGGCUGCCAGCUGUUUUU	2513	GAGAAAGATAAAAAGCTGGCAGCC	3117
117	GGCUGCCAGCUGUUUUU	2514	AGAGAAAGATAAAAAGCTGGCAGCC	3118
118	GCUGCCAGCUGUUUUU	2515	GAGAGAAAGATAAAAAGCTGGCAGC	3119
119	CUGCCAGCUGUUUUU	2516	CGAGAGAAAGATAAAAAGCTGGCAG	3120
120	UGCCAGCUGUUUUU	2517	TCGAGAGAAAGATAAAAAGCTGGCA	3121
121	GCCAGCUGUUUUU	2518	GTGAGAGAAAGATAAAAAGCTGGC	3122
122	CCAGCUGUUUUU	2519	GGTCGAGAGAAAGATAAAAAGCTGG	3123
123	CAGCUGUUUUU	2520	TGGTCGAGAGAAAGATAAAAAGCTG	3124
124	AGCUGUUUUU	2521	GTGGTCGAGAGAAAGATAAAAAGCT	3125
125	GCUGUUUUU	2522	AGTGGTCGAGAGAAAGATAAAAAGC	3126
126	CUGUUUUU	2523	AAGTGGTCGAGAGAAAGATAAAAAG	3127
132	AUCUUUCUCGACCAUUAAAAACU	2524	AGTTTTAAGTGGTCGAGAGAAAGAT	3128
133	UCUUUCUCGACCAUUAAAAACU	2525	AAGTTTTAAGTGGTCGAGAGAAAGA	3129
134	CUUUUCUCGACCAUUAAAAACU	2526	GAAAGTTTTAAGTGGTCGAGAGAAAG	3130
135	UUUCUCUCGACCAUUAAAAACU	2527	TGAAGTTTTAAGTGGTCGAGAGAAA	3131
136	UUUCUCUCGACCAUUAAAAACU	2528	CTGAAGTTTTAAGTGGTCGAGAGAA	3132
137	UUUCUCUCGACCAUUAAAAACU	2529	TCTGAAGTTTTAAGTGGTCGAGAGAA	3133
138	CUCUCGACCAUUAAAAACU	2530	GTCTGAAGTTTTAAGTGGTCGAGAG	3134
139	UCUCGACCAUUAAAAACU	2531	AGTCTGAAGTTTTAAGTGGTCGAGAA	3135
140	CUCGACCAUUAAAAACU	2532	AAGTCTGAAGTTTTAAGTGGTCGAG	3136
141	UCGACCAUUAAAAACU	2533	GAAAGTCTGAAGTTTTAAGTGGTCG	3137
142	CGACCAUUAAAAACU	2534	GGAAAGTCTGAAGTTTTAAGTGGTCG	3138
143	GACCAUUAAAAACU	2535	AGGAAAGTCTGAAGTTTTAAGTGGTC	3139
144	ACCAUUAAAAACU	2536	CAGGAAAGTCTGAAGTTTTAAGTGGT	3140
145	CCAUUUAAAAACU	2537	ACAGGAAGTCTGAAGTTTTAAGTGG	3141

Table 30

147	ACUUA AAAACUUCAGACUUCUGUCC	2538	GGACAGGAAGTCTGAAGTTTAAAGT	3142
148	CUUAAAACUUCAGACUUCUGUCCU	2539	AGGACAGGAAGTCTGAAGTTTAAAG	3143
149	UUA AAAACUUCAGACUUCUGUCCUG	2540	CAGGACAGGAAGTCTGAAGTTTAA	3144
150	UAAAACUUCAGACUUCUGUCCUGC	2541	GCAGGACAGGAAGTCTGAAGTTTAA	3145
151	AAAACUUCAGACUUCUGUCCUGUCC	2542	AGCAGGACAGGAAGTCTGAAGTTT	3146
152	AAACUUCAGACUUCUGUCCUGUCCUG	2543	CAGCAGGACAGGAAGTCTGAAGTTT	3147
153	AAUUCAGACUUCUGUCCUGUCCUGG	2544	CCAGCAGGACAGGAAGTCTGAAGTTT	3148
154	ACUUCAGACUUCUGUCCUGUCCUGGU	2545	ACCAGCAGGACAGGAAGTCTGAAGT	3149
155	CUUCAGACUUCUGUCCUGUCCUGGUA	2546	TACCAGCAGGACAGGAAGTCTGAAG	3150
156	UUCAGACUUCUGUCCUGUCCUGGUAU	2547	ATACCAGCAGGACAGGAAGTCTGAA	3151
157	UCAGACUUCUGUCCUGUCCUGGUAUC	2548	GATACCAGCAGGACAGGAAGTCTGA	3152
158	CAGACUUCUGUCCUGUCCUGGUAUCA	2549	TGATACCAGCAGGACAGGAAGTCTG	3153
159	AGACUUCUGUCCUGUCCUGGUAUCAU	2550	ATGATACCAGCAGGACAGGAAGTCT	3154
160	GACUUCUGUCCUGUCCUGGUAUCAUG	2551	CATGATACCAGCAGGACAGGAAGTCT	3155
161	ACUUCUGUCCUGUCCUGGUAUCAUGG	2552	CCATGATACCAGCAGGACAGGAAGT	3156
162	CUUCUGUCCUGUCCUGGUAUCAUGGA	2553	TCCATGATACCAGCAGGACAGGAAGT	3157
163	UUCUGUCCUGUCCUGGUAUCAUGGAG	2554	CTCCATGATACCAGCAGGACAGGAAG	3158
164	UCCUGUCCUGUCCUGGUAUCAUGGAGA	2555	TCTCCATGATACCAGCAGGACAGGA	3159
165	CCUGUCCUGUCCUGGUAUCAUGGAGAA	2556	TTCTCCATGATACCAGCAGGACAGG	3160
166	CUUGUCCUGUCCUGGUAUCAUGGAGAA	2557	TTTCTCCATGATACCAGCAGGACAG	3161
167	UGUCCUGUCCUGGUAUCAUGGAGAAAG	2558	CTTCTCCATGATACCAGCAGGACAG	3162
168	GUCCUGUCCUGGUAUCAUGGAGAAAGU	2559	ACTTCTCCATGATACCAGCAGGACAG	3163
169	UCCUGUCCUGGUAUCAUGGAGAAAGUC	2560	GACTTCTCCATGATACCAGCAGGAG	3164
170	CCUGUCCUGGUAUCAUGGAGAAAGUCC	2561	GGACTTCTCCATGATACCAGCAGG	3165
180	UCAUGGAGAAAGUCCAAUACCUAC	2562	GTGAGGTATTGGACTTTCTCCATGA	3166
181	CAUGGAGAAAGUCCAAUACCUACU	2563	AGTGAGGTATTGGACTTTCTCCATG	3167
182	AUGGAGAAAGUCCAAUACCUACUC	2564	GAGTGAGGTATTGGACTTTCTCCAT	3168
183	UGGAGAAAGUCCAAUACCUACUCG	2565	CGAGTGAGGTATTGGACTTTCTCCA	3169
184	GGAGAAAGUCCAAUACCUACUCGC	2566	GGAGTGAGGTATTGGACTTTCTCC	3170
185	GAGAAAGUCCAAUACCUACUCGCU	2567	AGCGAGTGAGGTATTGGACTTTCTC	3171
186	AGAAAGUCCAAUACCUACUCGCU	2568	GAGCGAGTGAGGTATTGGACTTTCT	3172
187	GAAAGUCCAAUACCUACUCGCUCA	2569	GTAGCGAGTGAGGTATTGGACTTTCT	3173
188	AAAGUCCAAUACCUACUCGCUACG	2570	CTGAGCGAGTGAGGTATTGGACTTT	3174
189	AAGUCCAAUACCUACUCGCUACGC	2571	GCTGAGCGAGTGAGGTATTGGACTT	3175
190	AGUCCAAUACCUACUCGCUACGCU	2572	AGTGAGCGAGTGAGGTATTGGACTT	3176
191	GUCCAAUACCUACUCGCUACGCUA	2573	TGAGTGAGCGAGTGAGGTATTGGAG	3177
192	UCCAAUACCUACUCGCUACGCUAU	2574	ATAGTGAGCGAGTGAGGTATTGGAG	3178
193	CCAAUACCUACUCGCUACGCUAUA	2575	TATAGTGAGCGAGTGAGGTATTGG	3179
194	CAAUACCUACUCGCUACGCUUAUA	2576	TTATAGTGAGCGAGTGAGGTATTGG	3180
195	AUACCUACUCGCUACGCUUAUAAG	2577	CTTATAGTGAGCGAGTGAGGTATTG	3181
196	AUACCUACUCGCUACGCUUAAGA	2578	CTTATAGTGAGCGAGTGAGGTATTG	3182
197	UACCUACUCGCUACGCUUAAGAA	2579	TTCTTATAGTGAGCGAGTGAGGTATT	3183
198	ACCUACUCGCUACGCUUAAGAAG	2580	CTTCTTATAGTGAGCGAGTGAGGTATT	3184
199	CCUACUCGCUACGCUUAAGAAGA	2581	TCTTCTTATAGTGAGCGAGTGAGGTATT	3185
200	CUACUCGCUACGCUUAAGAAGAG	2582	CTTCTTATAGTGAGCGAGTGAGGTATT	3186
201	UCAUCGCUACGCUUAAGAAGAGC	2583	GCTCTTCTTATAGTGAGCGAGTGAGT	3187
202	CACUCGCUACGCUUAAGAAGAGCC	2584	GGCTCTTCTTATAGTGAGCGAGTGAGT	3188

Table 30

203	ACUCGCUAGCUAUAGAAGAGCCU	2585	AGGCTCTTCTTATAGCTGAGCGAGT	3189
204	CUUGCGUCAGCUUAAGAAGAGCCUC	2586	GAGGCTCTTCTTATAGCTGAGCGAG	3190
205	UCGCUAGCUGAUAGAAGAGCCUCA	2587	TGAGGCTCTTCTTATAGCTGAGCGA	3191
206	CGCUCAGCUUAAGAAGAGCCUCA	2588	TTGAGGCTCTTCTTATAGCTGAGCG	3192
207	GCUCAGCUUAAGAAGAGCCUCAAC	2589	GTTGAGGCTCTTCTTATAGCTGAGC	3193
208	CUCAGCUUAAGAAGAGCCUCAACC	2590	GGTTGAGGCTCTTCTTATAGCTGAG	3194
209	UCAGCUUAAGAAGAGCCUCAACCA	2591	TGGTTGAGGCTCTTCTTATAGCTGA	3195
210	CAGCUUAAGAAGAGCCUCAACCAU	2592	ATGGTTGAGGCTCTTCTTATAGCTG	3196
211	AGCUUAAGAAGAGCCUCAACCAU	2593	AATGGTTGAGGCTCTTCTTATAGCT	3197
212	GCUAUAAGAAGAGCCUCAACCAU	2594	CAATGGTTGAGGCTCTTCTTATAGC	3198
213	CUUAUAAGAAGAGCCUCAACCAU	2595	TCAATGGTTGAGGCTCTTCTTATAG	3199
214	UAUAAGAAGAGCCUCAACCAU	2596	TTCAATGGTTGAGGCTCTTCTTATA	3200
215	AUAAGAAGAGCCUCAACCAU	2597	TTTCAATGGTTGAGGCTCTTCTTAT	3201
216	UAAGAAGAGCCUCAACCAU	2598	ATTTCAATGGTTGAGGCTCTTCTTA	3202
217	AAGAAGAGCCUCAACCAU	2599	CATTTCATGGTTGAGGCTCTTCTT	3203
218	AGAAGAGCCUCAACCAU	2600	GCATTTCAATGGTTGAGGCTCTTCT	3204
219	GAAGAGCCUCAACCAU	2601	GGCATTTCATGGTTGAGGCTCTTCT	3205
220	AAGAGCCUCAACCAU	2602	AGGCATTTCAATGGTTGAGGCTCTT	3206
221	AGAGCCUCAACCAU	2603	AGGCATTTCAATGGTTGAGGCTCTT	3207
222	GAGCCUCAACCAU	2604	TGAGGCATTTCAATGGTTGAGGCTCT	3208
223	AGCCUCAACCAU	2605	TTGAGGCATTTCAATGGTTGAGGCT	3209
224	GCCUCAACCAU	2606	GTTGAGGCATTTCAATGGTTGAGGCT	3210
225	CCUCAACCAU	2607	TGTTGAGGCATTTCAATGGTTGAGG	3211
226	CUCAACCAU	2608	TTGTTGAGGCATTTCAATGGTTGAG	3212
227	UCAACCAU	2609	CTTGTGAGGCATTTCAATGGTTGA	3213
228	CAACCAU	2610	GCTTGTGAGGCATTTCAATGGTTG	3214
229	AACCAU	2611	TGCTTGTGAGGCATTTCAATGGTT	3215
230	ACCAU	2612	GTGCTTGTGAGGCATTTCAATGGT	3216
231	CCAU	2613	CGTGCTTGTGAGGCATTTCAATGG	3217
232	CAU	2614	ACGTGCTTGTGAGGCATTTCAATG	3218
233	AU	2615	GACGTGCTTGTGAGGCATTTCAAT	3219
234	U	2616	TGACGTGCTTGTGAGGCATTTCAA	3220
235	UA	2617	TTGACGTGCTTGTGAGGCATTTCA	3221
236	G	2618	TTTGACGTGCTTGTGAGGCATTTTC	3222
237	AA	2619	TTTGACGTGCTTGTGAGGCATTTT	3223
238	AAU	2620	CTTTGACGTGCTTGTGAGGCATTT	3224
239	AUG	2621	GCTTTGACGTGCTTGTGAGGCAT	3225
240	UGG	2622	AGCTTTGACGTGCTTGTGAGGC	3226
241	GCC	2623	TAGCTTTGACGTGCTTGTGAGGC	3227
242	CCU	2624	GTAGCTTTGACGTGCTTGTGAGG	3228
243	CU	2625	TGTAGCTTTGACGTGCTTGTGAG	3229
244	UCA	2626	CTGTAGCTTTGACGTGCTTGTGA	3230
245	CA	2627	TCTGTAGCTTTGACGTGCTTGTG	3231
246	A	2628	TTCTGTAGCTTTGACGTGCTTGT	3232
247	ACA	2629	ATCTGTAGCTTTGACGTGCTTGT	3233
248	CAAG	2630	GATTCGTAGCTTTGACGTGCTTG	3234
249	AAG	2631	AGATTCGTAGCTTTGACGTGCTT	3235

Table 30

250	AGCACGUCAAAAGCUACAGAAUCUA	2632	TAGATTCTGTAGCTTTTGACGTGCT	3236
251	GCACGUCAAAAGCUACAGAAUCUAU	2633	ATAGATTCTGTAGCTTTTGACGTGC	3237
252	CACGUCAAAAGCUACAGAAUCUAUU	2634	AATAGATTCTGTAGCTTTTGACGTG	3238
253	ACGUCAAAAGCUACAGAAUCUAUUU	2635	AAATAGATTCTGTAGCTTTTGACGT	3239
254	CGUCAAAAGCUACAGAAUCUAUUUA	2636	TAAATAGATTCTGTAGCTTTTGACG	3240
255	GUCAAAAAGCUACAGAAUCUAUUUAU	2637	ATAAATAGATTCTGTAGCTTTTGAC	3241
256	UCAAAAAGCUACAGAAUCUAUUUAUC	2638	GATAAATAGATTCTGTAGCTTTTGA	3242
257	CAAAAAGCUACAGAAUCUAUUUAUCA	2639	TGATAAATAGATTCTGTAGCTTTTG	3243
258	AAAAGCUACAGAAUCUAUUUAUCAA	2640	TTGATAAATAGATTCTGTAGCTTTT	3244
259	AAAGCUACAGAAUCUAUUUAUCAAU	2641	ATTGATAAATAGATTCTGTAGCTTTT	3245
260	AAGCUACAGAAUCUAUUUAUCAUU	2642	AATTGATAAATAGATTCTGTAGCTT	3246
261	AGCUACAGAAUCUAUUUAUCAUUU	2643	AAATTGATAAATAGATTCTGTAGCT	3247
262	GCUCACAGAAUCUAUUUAUCAUUUC	2644	GAAATTGATAAATAGATTCTGTAGC	3248
263	CUACAGAAUCUAUUUAUCAUUUCU	2645	AGAAATTGATAAATAGATTCTGTAG	3249
264	UACAGAAUCUAUUUAUCAUUUCUG	2646	CAGAAATTGATAAATAGATTCTGTA	3250
265	ACAGAAUCUAUUUAUCAUUUCUGU	2647	ACAGAAATTGATAAATAGATTCTGT	3251
266	CAGAAUCUAUUUAUCAUUUCUGUC	2648	GACAGAAATTGATAAATAGATTCTG	3252
267	AGAAUCUAUUUAUCAUUUCUGUCU	2649	AGACAGAAATTGATAAATAGATTCT	3253
268	GAAUCUAUUUAUCAUUUCUGUCUC	2650	GACAGAAATTGATAAATAGATTCT	3254
269	AAUCUAUUUAUCAUUUCUGUCUCA	2651	TGAGACAGAAATTGATAAATAGATT	3255
270	AUCUAUUUAUCAUUUCUGUCUCAU	2652	ATGAGACAGAAATTGATAAATAGAT	3256
271	UCUAUUUAUCAUUUCUGUCUCAUC	2653	GATGAGACAGAAATTGATAAATAGA	3257
272	CUAUAUUUAUCAUUUCUGUCUCAUCU	2654	AGATGAGACAGAAATTGATAAATAG	3258
273	UAUAUUUAUCAUUUCUGUCUCAUCUU	2655	AAGATGAGACAGAAATTGATAAATA	3259
274	AUAUAUCAUUUCUGUCUCAUCUUA	2656	TAAGATGAGACAGAAATTGATAAAT	3260
275	UUUAUCAUUUCUGUCUCAUCUUAA	2657	TTAAGATGAGACAGAAATTGATAAA	3261
276	UUAUCAUUUCUGUCUCAUCUUAAU	2658	ATTAAGATGAGACAGAAATTGATAA	3262
277	UAUCAUUUCUGUCUCAUCUUAAUA	2659	TATTAAGATGAGACAGAAATTGATA	3263
278	AUCAUUUCUGUCUCAUCUUAAUAU	2660	ATATTAAGATGAGACAGAAATTGAT	3264
279	UCAUUUCUGUCUCAUCUUAAUAUG	2661	CATATTAAGATGAGACAGAAATTGA	3265
280	CAUUUCUGUCUCAUCUUAAUAUGU	2662	ACATATTAAGATGAGACAGAAATTG	3266
281	AAUUUCUGUCUCAUCUUAAUAUGUC	2663	GACATATTAAGATGAGACAGAAATT	3267
282	AUUUCUGUCUCAUCUUAAUAUGUCU	2664	AGACATATTAAGATGAGACAGAAAT	3268
283	UUUCUGUCUCAUCUUAAUAUGUCUC	2665	GAGACATATTAAGATGAGACAGAAA	3269
284	UUCUGUCUCAUCUUAAUAUGUCUCU	2666	AGAGACATATTAAGATGAGACAGAA	3270
285	UCUGUCUCAUCUUAAUAUGUCUCUU	2667	AAAGACATATTAAGATGAGACAGAA	3271
286	CUGUCUCAUCUUAAUAUGUCUCUUG	2668	CAAGAGACATATTAAGATGAGACAG	3272
287	UGUCUCAUCUUAAUAUGUCUCUUGC	2669	GCAAGAGACATATTAAGATGAGACA	3273
288	GCUCUCAUCUUAAUAUGUCUCUUGCU	2670	AGCAAGAGACATATTAAGATGAGAC	3274
289	UCUCUCAUCUUAAUAUGUCUCUUGCUG	2671	CAGCAAGAGACATATTAAGATGAGA	3275
290	CUCUCAUCUUAAUAUGUCUCUUGCUGA	2672	TCAGCAAGAGACATATTAAGATGAG	3276
291	UCAUCUCAUCUUAAUAUGUCUCUUGCAU	2673	ATCAAGCAAGAGACATATTAAGATGA	3277
292	CAUCUCAUCUUAAUAUGUCUCUUGCAUC	2674	GATCAGCAAGAGACATATTAAGATG	3278
293	AUCUCAUCUUAAUAUGUCUCUUGCUGAUCU	2675	AGATCAGCAAGAGACATATTAAGAT	3279
294	UCUCAUCUUAAUAUGUCUCUUGCUGAUCUG	2676	CAGATCAGCAAGAGACATATTAAG	3280
295	CUUCAUCUUAAUAUGUCUCUUGCUGAUCUGU	2677	ACAGATCAGCAAGAGACATATTAAG	3281
296	UUAUCAUCUUAAUAUGUCUCUUGCUGAUCUGUA	2678	TACAGATCAGCAAGAGACATATTA	3282

Table 30

297	UAAUAUGUCUCUGUGUGAUCUGUAU	2679	ATACAGATCAGCAAGAGACATATTA	3283
298	AADADUGUCUCUGUGUGAUCUGAUC	2680	GATACAGATCAGCAAGAGACATATT	3284
299	AUAUGUCUCUGUGUGAUCUGUAUCA	2681	TGATACAGATCAGCAAGAGACATAT	3285
300	UAUGUCUCUUGUGUGUGAUCUGUAU	2682	ATGATACAGATCAGCAAGAGACATA	3286
301	AUGUCUCUGUGUGAUCUGUAUCAUC	2683	GATGATACAGATCAGCAAGAGACAT	3287
302	UGUCUCUCUGUGUGAUCUGUAUCAUG	2684	CGATGATACAGATCAGCAAGAGACA	3288
303	GUCUCUCUGUGAUCUGUAUCAUCGU	2685	ACGATGATACAGATCAGCAAGAGAC	3289
304	UCUCUCUGUGAUCUGUAUCAUCUGG	2686	CACGATGATACAGATCAGCAAGAGA	3290
305	CUCUCUGUGAUCUGUAUCAUCUGGA	2687	TCACGATGATACAGATCAGCAAGAG	3291
306	UCUCUGUGAUCUGUAUCAUCUGGAU	2688	ATCACGATGATACAGATCAGCAAGA	3292
307	CUCUGUGAUCUGUAUCAUCUGGAUG	2689	CATCAGATGATACAGATCAGCAAG	3293
308	UUGUGAUCUGUAUCAUCUGGAUGC	2690	GCATCAGATGATACAGATCAGCAA	3294
309	UGUGAUCUGUAUCAUCUGGAUGCU	2691	AGCATCAGATGATACAGATCAGCA	3295
310	CGUGAUCUGUAUCAUCUGGAUGCUU	2692	AAGCATCAGATGATACAGATCAGC	3296
311	CUGAUCUGUAUCAUCUGGAUGCUUC	2693	GAAGCATCAGATGATACAGATCAG	3297
312	UGAUCUGUAUCAUCUGGAUGCUUCU	2694	GAAGCATCAGATGATACAGATCA	3298
313	GAUCUGUAUCAUCUGGAUGCUUCUC	2695	GAGAAGCATCAGATGATACAGATC	3299
314	AUCUGUAUCAUCUGGAUGCUUCUCU	2696	AGAGAAGCATCAGATGATACAGAT	3300
315	UCUGUAUCAUCUGGAUGCUUCUCUG	2697	CAGAGAAGCATCAGATGATACAG	3301
316	CUGUAUCAUCUGGAUGCUUCUCUGA	2698	TCAGAGAAGCATCAGATGATACAG	3302
317	UGUAUCAUCUGGAUGCUUCUCUGAA	2699	TTACAGAAGCATCAGATGATACA	3303
318	GUAUCAUCUGGAUGCUUCUCUGAAG	2700	CTTCAGAGAAGCATCAGATGATAC	3304
319	UAUCAUCAUCUGGAUGCUUCUGAAGU	2701	ACTTCAGAGAAGCATCAGATGATA	3305
320	AUCUAUCAUCUGGAUGCUUCUGAAGUU	2702	AACTTCAGAGAAGCATCAGATGAT	3306
321	UCAUCAUCUGGAUGCUUCUGAAGUUC	2703	GAACTTCAGAGAAGCATCAGATGA	3307
322	CAUCUGUAUCUGCUUCUGAAGUUUCU	2704	AGAACTTCAGAGAAGCATCAGATG	3308
323	AUCUGUAUCUGCUUCUGAAGUUUCUG	2705	CAGAACTTCAGAGAAGCATCAGAT	3309
324	UCUGUAUCUGCUUCUGAAGUUUCUGC	2706	GCAGAACTTCAGAGAAGCATCAG	3310
325	CGUGUAUCUGCUUCUGAAGUUUCUGU	2707	AGCAGAACTTCAGAGAAGCATCAG	3311
326	GUGAUCUGCUUCUGAAGUUUCUGCUA	2708	TAGCAGAACTTCAGAGAAGCATCAC	3312
327	UGAUCUGCUUCUGAAGUUUCUGCUAC	2709	GTAGCAGAACTTCAGAGAAGCATCA	3313
328	GAUCUGCUUCUGAAGUUUCUGCUACA	2710	TGTAGCAGAACTTCAGAGAAGCATC	3314
329	AUCUGCUUCUGAAGUUUCUGCUACAA	2711	TTGTAGCAGAACTTCAGAGAAGCAT	3315
330	UGCUUCUGAAGUUUCUGCUACAAC	2712	GTGTAGCAGAACTTCAGAGAAGCA	3316
331	GCUCUCUGAAGUUUCUGCUACAACC	2713	GGTGTAGCAGAACTTCAGAGAAGC	3317
332	CUUCUCUGAAGUUUCUGCUACAACCU	2714	AGGTGTAGCAGAACTTCAGAGAAG	3318
333	UUCUCUGAAGUUUCUGCUACAACCUUC	2715	GAGGTTGTAGCAGAACTTCAGAGAA	3319
334	UCUCUGAAGUUUCUGCUACAACCCUC	2716	AGAGGTTGTAGCAGAACTTCAGAGA	3320
335	CUCUGAAGUUUCUGCUACAACCCUCA	2717	TAGAGGTTGTAGCAGAACTTCAGAG	3321
336	UCUGAAGUUCUGCUACAACCCUCUAG	2718	CTAGAGGTTGTAGCAGAACTTCAGA	3322
337	CUGAAGUUCUGCUACAACCCUCUAGA	2719	TCTAGAGGTTGTAGCAGAACTTCAG	3323
338	UGAAGUUCUGCUACAACCCUCUAGAU	2720	ATCTAGAGGTTGTAGCAGAACTTCA	3324
339	GAAAGUUCUGCUACAACCCUCUAGAUC	2721	AGCTAGAGGTTGTAGCAGAACTTC	3325
340	AAGUUCUGCUACAACCCUCUAGAUUC	2722	AGATCTAGAGGTTGTAGCAGAACTT	3326
341	AGUUCUGCUACAACCCUCUAGAUUCG	2723	CAGATCTAGAGGTTGTAGCAGAACT	3327
342	GUUCUGCUACAACCCUCUAGAUUCGC	2724	GCAGATCTAGAGGTTGTAGCAGAA	3328
343	UUCUGCUACAACCCUCUAGAUUCGCA	2725	TGCAGATCTAGAGGTTGTAGCAGAA	3329

Table 30

344	UCUGCUACAACCUUGAGAUUCGAG	2726	CTGCAGATCTAGAGTTGTAGCAGA	3330
345	CUGCUACAACCUUGAGAUUCGAGC	2727	GCTGCAGATCTAGAGTTGTAGCAG	3331
346	UGCUACAACCUUGAGAUUCGAGCU	2728	AGCTGCAGATCTAGAGTTGTAGCA	3332
347	GCUACAACCUUGAGAUUCGAGCUU	2729	AAGCTGCAGATCTAGAGTTGTAGC	3333
348	CUACAACCUUGAGAUUCGAGCUUG	2730	CAAGCTGCAGATCTAGAGTTGTAG	3334
349	UACAACCUUGAGAUUCGAGCUUGC	2731	GCAAGCTGCAGATCTAGAGTTGTA	3335
350	ACAACCUUGAGAUUCGAGCUUGC	2732	GGCAAGCTGCAGATCTAGAGTTGT	3336
351	CAACCUUGAGAUUCGAGCUUGCCA	2733	TGGCAAGCTGCAGATCTAGAGTTG	3337
352	AACCUUGAGAUUCGAGCUUGCCAC	2734	GTGGCAAGCTGCAGATCTAGAGTT	3338
353	ACCUUGAGAUUCGAGCUUGCCACA	2735	TGTGGCAAGCTGCAGATCTAGAGTT	3339
354	CCUUGAGAUUCGAGCUUGCCACAU	2736	ATGTGGCAAGCTGCAGATCTAGAG	3340
355	CUUUGAGAUUCGAGCUUGCCACAUC	2737	GATGTGGCAAGCTGCAGATCTAGAG	3341
356	UCUUGAGAUUCGAGCUUGCCACAUC	2738	TGATGTGGCAAGCTGCAGATCTAGAG	3342
357	CUAGAUUCGAGCUUGCCACAUCAG	2739	CTGATGTGGCAAGCTGCAGATCTAG	3343
358	UAGAUUCGAGCUUGCCACAUCAGC	2740	GCTGATGTGGCAAGCTGCAGATCTA	3344
359	GCUGCCACAUCAGCUUAAAUCUG	2741	CAGATTTTAAGCTGATGTGGCAAGC	3345
360	CUUGCCACAUCAGCUUAAAUCUGU	2742	ACAGATTTTAAGCTGATGTGGCAAG	3346
361	UUGCCACAUCAGCUUAAAUCUGUC	2743	GACAGATTTTAAGCTGATGTGGCAA	3347
362	UGCCACAUCAGCUUAAAUCUGUCA	2744	TGACAGATTTTAAGCTGATGTGGCA	3348
363	GCCACAUCAGCUUAAAUCUGUCAU	2745	ATGACAGATTTTAAGCTGATGTGGC	3349
364	CCACAUCAGCUUAAAUCUGUCAUC	2746	GATGACAGATTTTAAGCTGATGTGG	3350
365	CACAUCAGCUUAAAUCUGUCAUCC	2747	GGATGACAGATTTTAAGCTGATGTG	3351
366	ACAUCAGCUUAAAUCUGUCAUCCC	2748	GGGATGACAGATTTTAAGCTGATGT	3352
367	CAUCAGCUUAAAUCUGUCAUCCCA	2749	TGGGATGACAGATTTTAAGCTGATG	3353
368	AUCAGCUUAAAUCUGUCAUCCCAU	2750	ATGGGATGACAGATTTTAAGCTGAT	3354
369	UCAGCUUAAAUCUGUCAUCCCAUG	2751	CATGGGATGACAGATTTTAAGCTGA	3355
370	CAGCUUAAAUCUGUCAUCCCAUGC	2752	GCATGGGATGACAGATTTTAAGCTG	3356
371	AGCUUAAAUCUGUCAUCCCAUGCA	2753	TGCATGGGATGACAGATTTTAAGCT	3357
372	GCUUAAAUCUGUCAUCCCAUGCAG	2754	CTGCATGGGATGACAGATTTTAAGC	3358
373	CUUAAAUCUGUCAUCCCAUGCAGA	2755	TCTGCATGGGATGACAGATTTTAAG	3359
374	UUAUAAAUCUGUCAUCCCAUGCAGAC	2756	GTCTGCATGGGATGACAGATTTTAA	3360
375	UAAAUCUGUCAUCCCAUGCAGACA	2757	TGTCTGCATGGGATGACAGATTTTAA	3361
376	UGUCUAAAUCUGUCAUCCCAUGCA	2758	GTTTCTCTGCATGGGATGACAGAT	3362
377	GUCAUCCUUGCAGCAGGAAAAACA	2759	TGTTTCTCTGCTGCATGGGATGAC	3363
378	UCAUCCUUGCAGCAGGAAAAACA	2760	TTGTTTCTCTGCTGCATGGGATGA	3364
379	CAUCCUUGCAGCAGGAAAAACAUA	2761	ATTGTTTCTCTGCTGCATGGGATG	3365
380	AUCCUUGCAGCAGGAAAAACAUAU	2762	TATTGTTTCTCTGCTGCATGGGAT	3366
381	UCCUUGCAGCAGGAAAAACAUAU	2763	ATATTGTTTCTCTGCTGCATGGGA	3367
382	CCUUGCAGCAGGAAAAACAUAU	2764	AAATTGTTTCTCTGCTGCATGGG	3368
383	CUUUGCAGCAGGAAAAACAUAU	2765	CAATATTGTTTCTCTGCTGCATGG	3369
384	CAUGCAGCAGGAAAAACAUAU	2766	ACAATTGTTTCTCTGCTGCATGG	3370
385	AUGCAGCAGGAAAAACAUAU	2767	TACAATTGTTTCTCTGCTGCAT	3371
386	UGCAGCAGGAAAAACAUAU	2768	ATACAATTGTTTCTCTGCTGCAT	3372
387	AACAGCAGCUCUCCUGAGUAGAAG	2769	TCTTCTACTCAGGAAGTGGTCTGT	3373
388	ACAGACCACUCCUGAGUAGAAGAG	2770	CTCTTCTACTCAGGAAGTGGTCTGT	3374
389	CAGACCACUCCUGAGUAGAAGAGU	2771	ACTCTTCTACTCAGGAAGTGGTCTG	3375
390	GACCACUCCUGAGUAGAAGAGU	2772	AAACTCTTCTACTCAGGAAGTGGT	3376

Table 30

431	ACCACUUCUGAGUAGAAGAGUUUC	2773	GAAACTCTTCTACTCAGGAAGTGGT	3377
432	CCACUUCUUGAGUAGAAGAGUUUCU	2774	AGAAACTCTTCTACTCAGGAAGTGG	3378
445	AGAAGAGUUUCUUUGUGAAAAGGUC	2775	GACCTTTTCACAAAGAACTCTTCT	3379
446	GAAGAGUUUCUUUGUGAAAAGGUC	2776	TGACCTTTTCACAAAGAACTCTTC	3380
447	AAGAGUUUCUUUGUGAAAAGGUCAA	2777	TTGACCTTTTCACAAAGAACTCTT	3381
448	AGAGUUUCUUUGUGAAAAGGUCAG	2778	CTTGACCTTTTCACAAAGAACTCT	3382
449	GAGUUUCUUUGUGAAAAGGUCAGA	2779	TCTTGACCTTTTCACAAAGAACTC	3383
450	AGUUUCUUUGUGAAAAGGUCAGAU	2780	ATCTTGACCTTTTCACAAAGAACT	3384
451	GUUUUCUUUGUGAAAAGGUCAGAUU	2781	AATCTTGACCTTTTCACAAAGAACT	3385
452	UUUCUUUGUGAAAAGGUCAGAUUA	2782	TAATCTTGACCTTTTCACAAAGAA	3386
453	UUUCUUUGUGAAAAGGUCAGAUUA	2783	TTAACTTGACCTTTTCACAAAGAA	3387
504	AUUCUUCUGUGAUCUUGUAAACA	2784	TGTTTACAAGATCCACAGATGAAT	3388
505	UUCAUCUUGUGAUCUUGUAAACA	2785	ATGTTTACAAGATCCACAGATGAA	3389
506	UCAUCUUGUGAUCUUGUAAACAUG	2786	CATGTTTACAAGATCCACAGATGA	3390
507	CAUCUUGUGAUCUUGUAAACAUGA	2787	TCATGTTTACAAGATCCACAGATG	3391
508	AUCUGUGAUCUUGUAAACAUGAA	2788	TTTCATGTTTACAAGATCCACAGAT	3392
509	UCUGUGAUCUUGUAAACAUGAAA	2789	TTTCATGTTTACAAGATCCACAGA	3393
510	CUGUGAUCUUGUAAACAUGAAAA	2790	TTTTTCATGTTTACAAGATCCACAG	3394
511	UGUGAUCUUGUAAACAUGAAAAAG	2791	CTTTTCATGTTTACAAGATCCACAA	3395
512	GUGAUCUUGUAAACAUGAAAAGG	2792	CCTTTTCATGTTTACAAGATCCAAC	3396
513	UGUGAUCUUGUAAACAUGAAAAGG	2793	CCCTTTTCATGTTTACAAGATCCAA	3397
514	UGGAUCUUGUAAACAUGAAAAGG	2794	GCCTTTTCATGTTTACAAGATCCAA	3398
515	GGUUCUUGUAAACAUGAAAAGGCU	2795	AGCCCTTTTCATGTTTACAAGATCC	3399
516	GAUCUUGUAAACAUGAAAAGGCUU	2796	AAGCCCTTTTCATGTTTACAAGATC	3400
517	AUCUUGUAAACAUGAAAAGGCUUU	2797	AAAGCCCTTTTCATGTTTACAAGAT	3401
518	UCUUGUAAACAUGAAAAGGCUUUA	2798	ATAAGCCCTTTTCATGTTTACAAGA	3402
519	CUUGUAAACAUGAAAAGGCUUUUA	2799	ATAAGCCCTTTTCATGTTTACAAG	3403
520	UUGUAAACAUGAAAAGGCUUUUAU	2800	AATAAGCCCTTTTCATGTTTACA	3404
521	UGUAAACAUGAAAAGGCUUUUAUU	2801	AAATAAGCCCTTTTCATGTTTACA	3405
522	GUAACAUGAAAAGGCUUUUAUUUU	2802	AAATAAGCCCTTTTCATGTTTATC	3406
531	AAAGGCUUUUAUUUCAA AAAUUA	2803	TAATTTTGAATAAAGCCCTTTT	3407
532	AAAGGCUUUUAUUUCAA AAAUUA	2804	TTAATTTTGAATAAAGCCCTTTT	3408
533	AAGGCUUUUAUUUCAA AAAUUAAC	2805	GTTAATTTTGAATAAAGCCCTTT	3409
534	AGGCUUUUAUUUCAA AAAUUAACU	2806	AGTTAATTTTGAATAAAGCCCTT	3410
535	GGGCUUUUAUUUCAA AAAUUAACU	2807	AAGTTAATTTTGAATAAAGCCCTT	3411
570	GUUAAAAGCAACUGUGAUUUUCC	2808	GGAAATCAACAGTTCATTTTATAC	3412
571	UAUAAAAGCAACUGUGAUUUUCCU	2809	AGGAAATCAACAGTTCATTTTATA	3413
572	AUAAAAGCAACUGUGAUUUUCCUC	2810	GAGGAAATCAACAGTTCATTTTAT	3414
573	UAAAAGCAACUGUGAUUUUCCUCA	2811	TGAGGAAATCAACAGTTCATTTTAT	3415
574	AAAAGCAACUGUGAUUUUCCUCA	2812	TTGAGGAAATCAACAGTTCATTTT	3416
586	UUGAUUUCCUCAAACUGGCUCAAA	2813	TTGTGAGCCATGTTGAGGAAATCA	3417
587	UGAUUUCCUCAAACUGGCUCAAAA	2814	TTGTGAGCCATGTTGAGGAAATCA	3418
588	GAUUUCCUCAAACUGGCUCAAAAU	2815	ATTGTGAGCCATGTTGAGGAAATC	3419
589	AUUUUCCUCAAACUGGCUCAAAAU	2816	AAATTGTGAGCCATGTTGAGGAAAT	3420
590	UUUCUCAAACUGGCUCAAAAUUU	2817	AAATTGTGAGCCATGTTGAGGAAAT	3421
591	UJCCUCAAACUGGCUCAAAAUUUC	2818	GAAATTTGTGAGCCATGTTGAGGAA	3422
592	UCCUCAACAUGGCUCAAAAUUUCU	2819	AGAAATTTGTGAGCCATGTTGAGGA	3423

Table 30

593	CCUCAACAUGGCUCACAAAUUCUA	2820	TAGAAATTTGTGAGCCATGTTGAGG	3424
594	CUCACAAUGGCUCACAAAUUCUAU	2821	ATAGAAATTTGTGAGCCATGTTGAG	3425
595	UCAACAUGGCUCACAAAUUCUAUC	2822	GATAGAAATTTGTGAGCCATGTTGA	3426
596	CAACAUGGCUCACAAAUUCUAUCC	2823	GGATAGAAATTTGTGAGCCATGTTG	3427
597	AACADGGCUCACAAAUUCUAUCCC	2824	GGGATAGAAATTTGTGAGCCATGTT	3428
598	ACAUGGCUCACAAAUUCUAUCCCA	2825	TGGGATAGAAATTTGTGAGCCATGT	3429
599	CAUGGCUCACAAAUUCUAUCCCAA	2826	TTGGGATAGAAATTTGTGAGCCATG	3430
600	AUGGCUCACAAAUUCUAUCCCAAA	2827	TTGGGATAGAAATTTGTGAGCCAT	3431
601	UGGCUCACAAAUUCUAUCCCAAAU	2828	ATTGGGATAGAAATTTGTGAGCCA	3432
602	GGCUCACAAAUUCUAUCCCAAAUC	2829	GATTGGGATAGAAATTTGTGAGCC	3433
603	GCUCACAAAUUCUAUCCCAAAUCU	2830	AGATTGGGATAGAAATTTGTGAGC	3434
604	CUCACAAAUUCUAUCCCAAAUCU	2831	AAGATTGGGATAGAAATTTGTGAG	3435
605	UCACAAAUUCUAUCCCAAAUCUU	2832	AAAGATTGGGATAGAAATTTGTGA	3436
606	CACAAAUUCUAUCCCAAAUCUUU	2833	AAAAGATTGGGATAGAAATTTGTG	3437
607	ACAAAUUCUAUCCCAAAUCUUUU	2834	AAAAAGATTGGGATAGAAATTTGT	3438
608	CAAAUUCUAUCCCAAAUCUUUUU	2835	AGAAAAGATTGGGATAGAAATTTG	3439
609	AAAUUCUAUCCCAAAUCUUUUUG	2836	CAGAAAAGATTGGGATAGAAATTT	3440
610	AAUUCUAUCCCAAAUCUUUUCGA	2837	TCAGAAAAGATTGGGATAGAAATTT	3441
611	AUUUCUAUCCCAAAUCUUUUCGAA	2838	TTCAGAAAAGATTGGGATAGAAAT	3442
612	UUUCUAUCCCAAAUCUUUUCGAAG	2839	CTTCAGAAAAGATTGGGATAGAAA	3443
613	UUCUAUCCCAAAUCUUUUCGAAGA	2840	CTTCAGAAAAGATTGGGATAGAAA	3444
614	GUUAGUUUUAAAACUGCACUGCCA	2841	TGGCAGTGCAGTTTAAAACTAAAC	3445
615	UUUAGUUUUAAAACUGCACUGCCAA	2842	TTGGCAGTGCAGTTTAAAACTAA	3446
616	UUAGUUUUAAAACUGCACUGCCAAC	2843	GTTGGCAGTGCAGTTTAAAACTAA	3447
617	UAGUUUUAAAACUGCACUGCCAACA	2844	TGTTGGCAGTGCAGTTTAAAACTA	3448
618	AGUUUUAAAACUGCACUGCCAACAA	2845	TTGTTGGCAGTGCAGTTTAAAACT	3449
619	GUUUUUAAAACUGCACUGCCAACAAG	2846	CTTGTGGCAGTGCAGTTTAAAACT	3450
620	UUUUUUAAAACUGCACUGCCAACAGU	2847	ACTGTGGCAGTGCAGTTTAAAACT	3451
621	UUUUAAAACUGCACUGCCAACAGUU	2848	AACTTGTGGCAGTGCAGTTTAAAA	3452
622	UUAAAACUGCACUGCCAACAGUUC	2849	GAACTTGTGGCAGTGCAGTTTAAA	3453
623	UAAAACUGCACUGCCAACAGUUA	2850	TGAACCTTGTGGCAGTGCAGTTTAA	3454
624	AAAACUGCACUGCCAACAGUUCAC	2851	GTGAACCTTGTGGCAGTGCAGTTT	3455
625	AAACUGCACUGCCAACAGUUCACU	2852	AGTGAACCTTGTGGCAGTGCAGTT	3456
626	AACUGCACUGCCAACAGUUCACUU	2853	AAGTGAACCTTGTGGCAGTGCAGTT	3457
627	ACUGCACUGCCAACAGUUCACUUC	2854	GAAGTGAACCTTGTGGCAGTGCAGT	3458
628	CUGCACUGCCAACAGUUCACUUA	2855	TGAAGTGAACCTTGTGGCAGTGCAG	3459
629	UGCACUGCCAACAGUUCACUUAU	2856	ATGAAGTGAACCTTGTGGCAGTGCA	3460
630	GCACUGCCAACAGUUCACUUAUA	2857	TATGAAGTGAACCTTGTGGCAGTGC	3461
631	CACUGCCAACAGUUCACUUAUAU	2858	ATATGAAGTGAACCTTGTGGCAGTG	3462
632	ACUGCCAACAGUUCACUUAUAUA	2859	TATATGAAGTGAACCTTGTGGCAGT	3463
633	UUGCCAACAGUUCACUUAUAUAU	2860	ATATATGAAGTGAACCTTGTGGCAG	3464
755	UAAGUUUUUUCAGGUCUUCACCAA	2861	TTGGTGAAGACCTGAAAAATACTTA	3465
756	AAGUUUUUUCAGGUCUUCACCAAG	2862	CTTGGTGAAGACCTGAAAAATACTT	3466
757	AGUUUUUUUCAGGUCUUCACCAAGU	2863	ACTTGGTGAAGACCTGAAAAATACT	3467
760	AUUUUUCAGGUCUUCACCAAGUUC	2864	GATACTTGGTGAAGACCTGAAAAAT	3468
761	UUUUUCAGGUCUUCACCAAGUUA	2865	TGATACTTGGTGAAGACCTGAAAA	3469
762	UUUUUCAGGUCUUCACCAAGUUA	2866	TGATACTTGGTGAAGACCTGAAAA	3470

Table 30

763	UUUCAGGUCUUCACCAAGUAUCAA	2867	TTTGATACTTGGTGAAGACCTGAAA	3471
764	UUCAGGUCUUCACCAAGUAUCAAAG	2868	CTTTGATACTTGGTGAAGACCTGAA	3472
765	UCAGGUCUUCACCAAGUAUCAAAGU	2869	ACTTTGATACTTGGTGAAGACCTGA	3473
766	CAGGUCUUCACCAAGUAUCAAAGUA	2870	TACTTTGATACTTGGTGAAGACCTG	3474
813	AUUCAAAUAGUCCACUGACUCCUC	2871	GAGGAGTCAGTGGACTATTTTGAAT	3475
814	UUCAAAUAGUCCACUGACUCCUCA	2872	TGAGGAGTCAGTGGACTATTTTGA	3476
815	UCAAUAGUCCACUGACUCCUCAC	2873	GTGAGGAGTCAGTGGACTATTTTGA	3477
816	CAAAUAGUCCACUGACUCCUCA	2874	TGTGAGGAGTCAGTGGACTATTTTG	3478
817	AAAUAGUCCACUGACUCCUCAU	2875	ATGTGAGGAGTCAGTGGACTATTT	3479
818	AAUAGUCCACUGACUCCUCAU	2876	GATGTGAGGAGTCAGTGGACTATTT	3480
819	AUAGUCCACUGACUCCUCAU	2877	AGATGTGAGGAGTCAGTGGACTATT	3481
820	AUAGUCCACUGACUCCUCAU	2878	CAGATGTGAGGAGTCAGTGGACTAT	3482
821	UAGUCCACUGACUCCUCAU	2879	ACAGATGTGAGGAGTCAGTGGACTA	3483
822	AGUCCACUGACUCCUCAU	2880	AACAGATGTGAGGAGTCAGTGGACT	3484
823	GUCCACUGACUCCUCAU	2881	TAAACAGATGTGAGGAGTCAGTGGAC	3485
824	UCCACUGACUCCUCAU	2882	ATAACAGATGTGAGGAGTCAGTGGGA	3486
825	CCACUGACUCCUCAU	2883	GATTAACAGATGTGAGGAGTCAGTGG	3487
911	UUUUUUAUAGUCCACUUAUAAU	2884	AAGATGTTAATGTGGCATAGAAAA	3488
912	UUUUUUAUAGUCCACUUAUAAU	2885	AAGATGTTAATGTGGCATAGAAAA	3489
913	UUUUUUAUAGUCCACUUAUAAU	2886	AAAAGATGTTAATGTGGCATAGAAAA	3490
919	UGCCACUUAUAGUCCACUUAUAAU	2887	AACTTTAAAGATGTTAATGTGGCA	3491
920	GCCACUUAUAGUCCACUUAUAAU	2888	CAACTTTAAAGATGTTAATGTGGC	3492
948	AGAAUUAAGUAGGAAAGUAAGGC	2889	GCCTTACTTTTCCATCTGATTCT	3493
949	GAUUAAGUAGGAAAGUAAGGCC	2890	GGCCTTACTTTTCCATCTGATTCT	3494
950	AAUUAAGUAGGAAAGUAAGGCC	2891	TGGCCTTACTTTTCCATCTGATT	3495
959	UGGAAAGUAGGAAAGUAAGGCC	2892	GTAAGAGTATGGCCTTACTTTTCCA	3496
960	GGAAAGUAGGAAAGUAAGGCC	2893	TGTAAGAGTATGGCCTTACTTTTCC	3497
1067	CAUUAAGUAGGAAAGUAAGGCC	2894	CAGTTCATCTGTTGATCATATG	3498
1069	UAUUAAGUAGGAAAGUAAGGCC	2895	CACCACTTCATCTGTTGATCATAT	3499
1070	AUAUAAGUAGGAAAGUAAGGCC	2896	CCACCACTTCATCTGTTGATCAT	3500
1071	UGAUAAGUAGGAAAGUAAGGCC	2897	ACCACCACTTCATCTGTTGATCAT	3501
1072	GAUUAAGUAGGAAAGUAAGGCC	2898	AACCACTTCATCTGTTGATCAT	3502
1073	AUAUAAGUAGGAAAGUAAGGCC	2899	TAACCACTTCATCTGTTGATCAT	3503
1074	UUAUAAGUAGGAAAGUAAGGCC	2900	TTAACCACTTCATCTGTTGATCAT	3504
1075	CAUAUAAGUAGGAAAGUAAGGCC	2901	ATTAACCACTTCATCTGTTGATCAT	3505
1078	CAGUAUAAGUAGGAAAGUAAGGCC	2902	CATATTAACCACTTCATCTGTTGATCAT	3506
1080	GAGUAUAAGUAGGAAAGUAAGGCC	2903	CACATATTAACCACTTCATCTGTTGATCAT	3507
1081	AUGUAUAAGUAGGAAAGUAAGGCC	2904	TCACATATTAACCACTTCATCTGTTGATCAT	3508
1082	UGUAUAAGUAGGAAAGUAAGGCC	2905	GTACATATTAACCACTTCATCTGTTGATCAT	3509
1083	GAGUAUAAGUAGGAAAGUAAGGCC	2906	TGTCACATATTAACCACTTCATCTGTTGATCAT	3510
1086	AACUGGUGUUAUUAUGUGACAGUGA	2907	CACCTGTACATATTAACCACTTCATCTGTTGATCAT	3511
1087	ACUGGUGUUAUUAUGUGACAGUGA	2908	TCACCTGTACATATTAACCACTTCATCTGTTGATCAT	3512
1088	CUGGUGUUAUUAUGUGACAGUGA	2909	CTCACCTGTACATATTAACCACTTCATCTGTTGATCAT	3513
1089	UGGUGUUAUUAUGUGACAGUGA	2910	TCTCACCTGTACATATTAACCACTTCATCTGTTGATCAT	3514
1141	CAGAAUCUUAUUAUGUGACAGUGA	2911	TGCTTAAATGAAGATTAGATTCTG	3515
1150	AUCUUAUUAUUAUGUGACAGUGA	2912	TCACTACAGTGCCTTAAATGAAGAT	3516
1151	UCUUAUUAUUAUGUGACAGUGA	2913	TTCACTACAGTGCCTTAAATGAAGAT	3517

Table 30

1153	UUCAUUUAAGGCAUGUAGUGAAUU	2914	AATTCACACATGCGCTTAAATGAA	3518
1161	AGGCACUGAGUGAAUUAUCUGAGC	2915	GCTCAGATAATTCACACAGTGCT	3519
1162	GGCACUGUAGUGAAUUAUCUGAGCU	2916	AGCTCAGATAATTCACACAGTGCT	3520
1211	UAUCUUGUGAAUUAUGAAACCUUAA	2917	TTAAGGTTTCATGATTCGAAAGATA	3521
1212	AUCUUGUGAAUUAUGAAACCUUAAAG	2918	CTTAAGGTTTCATGATTCGAAAGATA	3522
1213	UCUUGUGAAUUAUGAAACCUUAAAGA	2919	TCTTAAGGTTTCATGATTCGAAAGATA	3523
1214	CUUUGGAAUUAUGAAACCUUAAAGAC	2920	GCTTAAAGGTTTCATGATTCGAAAG	3524
1215	UUUGGAAUUAUGAAACCUUAAAGACU	2921	AGTCTTAAGGTTTCATGATTCGAAA	3525
1216	UUGGAAUUAUGAAACCUUAAAGACUU	2922	AAGTCTTAAGGTTTCATGATTCGAAA	3526
1217	UGGAAUUAUGAAACCUUAAAGACUUC	2923	GAGTCTTAAGGTTTCATGATTCGAAA	3527
1218	GGAAUUAUGAAACCUUAAAGACUUA	2924	TGAAGTCTTAAGGTTTCATGATTCG	3528
1223	CAUGAAACCUUAAAGACUUCGAAUUG	2925	CATTCTGAAGTCTTAAGGTTTCATG	3529
1230	CCUUAAGACUUCGAAUUGAUUUUGC	2926	GCAAAATCATTCTGAAGTCTTAAGG	3530
1231	CUUAAGACUUCGAAUUGAUUUUGCA	2927	TGCAAAATCATTCTGAAGTCTTAAG	3531
1232	UUAAGACUUCGAAUUGAUUUUGCAG	2928	CTGCAAAATCATTCTGAAGTCTTAA	3532
1233	UAAAGACUUCGAAUUGAUUUUGCAGG	2929	CTGCAAAATCATTCTGAAGTCTTAA	3533
1234	AAGACUUCGAAUUGAUUUUGCAGGU	2930	ACCTGCAAAATCATTCTGAAGTCTT	3534
1235	AGACUUCGAAUUGAUUUUGCAGGUU	2931	AACCTGCAAAATCATTCTGAAGTCT	3535
1236	GACUUCGAAUUGAUUUUGCAGGUUG	2932	CAACCTGCAAAATCATTCTGAAGTCT	3536
1237	ACUUCGAAUUGAUUUUGCAGGUUGU	2933	ACAACCTGCAAAATCATTCTGAAGT	3537
1238	CUUCGAAUUGAUUUUGCAGGUUGUC	2934	GACAACCTGCAAAATCATTCTGAAG	3538
1239	UUCGAAUUGAUUUUGCAGGUUGUCU	2935	AGACAACCTGCAAAATCATTCTGAA	3539
1240	UCGAAUUGAUUUUGCAGGUUGUCUU	2936	AAGACAACCTGCAAAATCATTCTGA	3540
1241	CAGAAUUGAUUUUGCAGGUUGUCUUC	2937	GAGACAACCTGCAAAATCATTCTG	3541
1242	AGAAUUGAUUUUGCAGGUUGUCUCC	2938	GGAAGACAACCTGCAAAATCATTCT	3542
1243	GAAUUGAUUUUGCAGGUUGUCUCCA	2939	TGGAAGACAACCTGCAAAATCATTCT	3543
1244	AAUUGAUUUUGCAGGUUGUCUCCAU	2940	ATGGAAGACAACCTGCAAAATCAT	3544
1245	AUGAUUUUGCAGGUUGUCUCCAUU	2941	AATGGAAGACAACCTGCAAAATCAT	3545
1246	UGAUUUUGCAGGUUGUCUCCAUUC	2942	GAAATGGAAGACAACCTGCAAAATCA	3546
1247	GAUUUGCAGGUUGUCUCCAUUCC	2943	GGAATGGAAGACAACCTGCAAAATC	3547
1248	AUUUGCAGGUUGUCUCCAUUCCA	2944	TGGAATGGAAGACAACCTGCAAAAT	3548
1249	UUUGCAGGUUGUCUCCAUUCCAG	2945	CTGGAATGGAAGACAACCTGCAAAA	3549
1250	UUUGCAGGUUGUCUCCAUUCCAGC	2946	GCTGGAATGGAAGACAACCTGCAAA	3550
1251	UUGCAGGUUGUCUCCAUUCCAGCC	2947	GGCTGGAATGGAAGACAACCTGCAA	3551
1252	UGCAGGUUGUCUCCAUUCCAGCCU	2948	AGGCTGGAATGGAAGACAACCTGCA	3552
1253	GCAGGUUGUCUCCAUUCCAGCCUA	2949	TAGGCTGGAATGGAAGACAACCTGC	3553
1254	CAGGUUGUCUCCAUUCCAGCCUAA	2950	TTAGGCTGGAATGGAAGACAACCTG	3554
1255	AGGUUGUCUCCAUUCCAGCCUAAU	2951	GTTAGGCTGGAATGGAAGACAACCT	3555
1256	GGUUGUCUCCAUUCCAGCCUAAUA	2952	TGTTAGGCTGGAATGGAAGACAAC	3556
1257	GUUGUCUCCAUUCCAGCCUAAUAU	2953	ATGTTAGGCTGGAATGGAAGACAAC	3557
1258	UUGUCUCCAUUCCAGCCUAAUAUC	2954	GATGTTAGGCTGGAATGGAAGACA	3558
1259	UGUCUCCAUUCCAGCCUAAUAUCC	2955	GGATGTTAGGCTGGAATGGAAGACA	3559
1260	GUCUCCAUUCCAGCCUAAUAUCCA	2956	TGGATGTTAGGCTGGAATGGAAGACA	3560
1261	UCUCUCCAUUCCAGCCUAAUAUCCA	2957	TTGGATGTTAGGCTGGAATGGAAGACA	3561
1262	CUUCUCCAUUCCAGCCUAAUAUCCA	2958	ATGGATGTTAGGCTGGAATGGAAGACA	3562
1263	UUCCAUUCCAGCCUAAUAUCCAUG	2959	CATTGGATGTTAGGCTGGAATGGAAGACA	3563
1264	UCCAUUCCAGCCUAAUAUCCAUGC	2960	GCATTGGATGTTAGGCTGGAATGGAAGACA	3564

Table 30

1265	CCAUUCCAGCCUAAACAUCCAAUGCA	2961	TGCATTGGATGTTAGCTGGAATGG	3565
1266	CAUUCAGGCCUUAACAUCCAAUGCAG	2962	CTGCATTGGATGTTAGGCTGGAATG	3566
1267	AUUUCAGCCUAAACAUUGCAGG	2963	CTGCTGATTGGATGTAGGCTGGAAT	3567
1274	CCUAAACUCCAAUGCAGGCAAGGAA	2964	TTCCCTTGCCATGATTGGATGTTAGG	3568
1275	CUAACAUCCAAUGCAGGCAAGGAA	2965	TTTCTTGCCGTGATTGGATGTTAG	3569
1276	UAAACAUCCAAUGCAGGCAAGGAAUA	2966	TTTCTTGCCGTGATTGGATGTTA	3570
1277	AACAUCCAAUGCAGGCAAGGAAUAU	2967	ATTTTCCTTGCCGTGATTGGATGTT	3571
1278	ACAUCCAAUGCAGGCAAGGAAUAUA	2968	TATTTTCTTGCCGTGATTGGATG	3572
1279	CAUCCAAUGCAGGCAAGGAAUAUA	2969	TATTTTCTTGCCGTGATTGGATG	3573
1280	AUCCAAUGCAGGCAAGGAAUAUAA	2970	TTTATTTCTTGCCGTGATTGGAT	3574
1281	UCCAAUGCAGGCAAGGAAUAUAAA	2971	TTTATTTTCTTGCCGTGATTGGA	3575
1282	CCAAUGCAGGCAAGGAAUAUAUAG	2972	CTTTTATTTCTTGCCGTGATTGG	3576
1283	CAUAGCAGGCAAGGAAUAUAAGA	2973	TCTTTTATTTCTTGCCGTGATTG	3577
1284	AUUGCAGGCAAGGAAUAUAAGAU	2974	ATCTTTTATTTCTTGCCGTGATT	3578
1285	UGCAGGCAAGGAAUAUAAGAUU	2975	AATCTTTTATTTCTTGCCGTGAT	3579
1286	UGCAGGCAAGGAAUAUAAGAUUU	2976	AAATCTTTTATTTCTTGCCGTGA	3580
1287	GCAGGCAAGGAAUAUAAGAUUUC	2977	GAAATCTTTTATTTCTTGCCCTGC	3581
1301	UUAAGAUUUCCAGUGACAGAAATA	2978	TTTTCTGTCACTGGAATCTTTTA	3582
1302	AAAGAUUUCCAGUGACAGAAATAU	2979	ATTTTCTGTCACTGGAATCTTTT	3583
1303	UAUAUUUGAAUUGAACUUGUUGGC	2980	GCCACAAGTTCATTTCAAATATA	3584
1394	AUAUUUUUGAAUUGAACUUGUUGCC	2981	GGCCACAAGTTCATTTCAAATAT	3585
1395	UAUUUUUGAAUUGAACUUGUUGGCC	2982	GGGCCACAAGTTCATTTCAAATA	3586
1396	AUUUUUGAAUUGAACUUGUUGGCCA	2983	TGGGCCACAAGTTCATTTCAAAT	3587
1397	UUUUGAAUUGAACUUGUUGGCCAU	2984	ATGGGCCACAAGTTCATTTCAAA	3588
1398	UUUUGAAUUGAACUUGUUGGCCCAU	2985	GATGGGCCACAAGTTCATTTCAAA	3589
1399	UUGAAUUGAACUUGUUGGCCCAUCU	2986	AGATGGGCCACAAGTTCATTTCAA	3590
1400	UGAAUUGAACUUGUUGGCCCAUCUA	2987	TAGATGGGCCACAAGTTCATTTC	3591
1401	GAAUUGAACUUGUUGGCCCAUCUAU	2988	ATAGATGGGCCACAAGTTCATTTC	3592
1402	AAUUGAACUUGUUGGCCCAUCUAUU	2989	ATAAGATGGGCCACAAGTTCATT	3593
1403	AUAUGAACUUGUUGGCCCAUCUAUA	2990	TAATAGATGGGCCACAAGTTCATT	3594
1404	UGAACUUGUUGGCCCAUCUAUUAC	2991	GTAATAGATGGGCCACAAGTTCAT	3595
1405	UGAACUUGUUGGCCCAUCUAUUA	2992	TGTAATAGATGGGCCACAAGTTC	3596
1406	GAACUUGUUGGCCCAUCUAUUACAU	2993	ATGTAATAGATGGGCCACAAGTTC	3597
1407	ACUUGUUGGCCCAUCUAUUACAUAC	2994	GATGTAATAGATGGGCCACAAGTTC	3598
1408	ACUUGUUGGCCCAUCUAUUACUAU	2995	AGATGTAATAGATGGGCCACAAGT	3599
1409	CUUGUUGGCCCAUCUAUUACUAUCU	2996	TAGATGTAATAGATGGGCCACAAG	3600
1410	UUUGUUGGCCCAUCUAUUACUUAUC	2997	TGATAGTGAATAGATGGGCCACA	3601
1411	UGUUGGCCCAUCUAUUACUUAUCUA	2998	CTGATAGTGAATAGATGGGCCACA	3602
1412	GUUGGCCCAUCUAUUACUAUCUACAG	2999	CTGTAGATGTAATAGATGGGCCAC	3603
1413	UGUGGCCCAUCUAUUACUAUCUACG	3000	GCCTGATAGTGAATAGATGGGCCA	3604
1414	UGGCCCAUCUAUUACUAUCUACAGC	3001	AGCTGATAGTGAATAGATGGGCCA	3605
1415	GGGCCCAUCUAUUACUAUCUACAGCUG	3002	CAGCTGATAGTGAATAGATGGGCC	3606
1416	GCGCCAUCUAUUACUAUCUACAGCUGA	3003	TCAGCTGTAGATGTAATAGATGGCC	3607
1422	CUUAUACUACUACAGCUGACCCUUA	3004	CAAGGTCAGCTGTAGATGTAATAG	3608
1423	UAUUAUACUACUACAGCUGACCCUUA	3005	TCAGGTCAGCTGTAGATGTAATAG	3609
1424	AUUAUACUACUACAGCUGACCCUUA	3006	TTCAAGGTCAGCTGTAGATGTAAT	3610
1425	UUAUACUACUACAGCUGACCCUUAAC	3007	GTTCAAGGTCAGCTGTAGATGTAAT	3611

Table 30

1426	UACAUCACAGCUGACCCUUGAACAA	3008	TGTTCAAGGGTCAGCTGTAGATGTA	3612
1427	ACAUCUACAGCUGACCCUUGAACAU	3009	ATGTTCAAGGGTCAGCTGTAGATGT	3613
1428	CAUCUACAGCUGACCCUUGAACAU	3010	CAGTTTCAAGGGTCAGCTGTAGATG	3614
1429	AUCUACAGCUGACCCUUGAACAU	3011	CCATGTTCAAGGGTCAGCTGTAGAT	3615
1442	CCUUGAACAUAGGGGGUAGGGGAGC	3012	GCTCCCTTAACCCCATGTTCAAGG	3616
1443	CUUGAACAUAGGGGGUAGGGGAGCU	3013	AGCTCCCTTAACCCCATGTTCAAG	3617
1444	UUGAACAUAGGGGGUAGGGGAGCUG	3014	CAGCTCCCTTAACCCCATGTTCAA	3618
1445	UGAACAUAGGGGGUAGGGGAGCUGA	3015	TCAGCTCCCTTAACCCCATGTTCA	3619
1446	GAACAUAGGGGGUAGGGGAGCUGAC	3016	GTCAGCTCCCTTAACCCCATGTTC	3620
1447	AACAUAGGGGGUAGGGGAGCUGACA	3017	TGTCAGCTCCCTTAACCCCATGTT	3621
1448	ACAUGGGGGUAGGGGAGCUGACAA	3018	TTGTCAGCTCCCTTAACCCCATGT	3622
1449	CAUGGGGGUAGGGGAGCUGACAAU	3019	ATTGTCAGCTCCCTTAACCCCATG	3623
1450	AUGGGGGUAGGGGAGCUGACAAU	3020	AATTGTCAGCTCCCTTAACCCCAT	3624
1451	UGGGGGUAGGGGAGCUGACAAUUC	3021	GAATTGTCAGCTCCCTTAACCCCA	3625
1452	GGGGUAGGGGAGCUGACAAUUCG	3022	CGAATTGTCAGCTCCCTTAACCC	3626
1453	GGGUAGGGGAGCUGACAAUUCGU	3023	ACGAATTGTCAGCTCCCTTAACCC	3627
1454	GGUAGGGGAGCUGACAAUUCGUG	3024	CACGAATTGTCAGCTCCCTTAACCC	3628
1455	GGUAGGGGAGCUGACAAUUCGUGG	3025	CCACGAATTGTCAGCTCCCTTAACC	3629
1456	GUUAGGGGAGCUGACAAUUCGUGG	3026	CCACGAATTGTCAGCTCCCTTAACC	3630
1457	UUAAGGGGAGCUGACAAUUCGUGGU	3027	ACCCACGAATTGTCAGCTCCCTTAA	3631
1458	UAGGGGAGCUGACAAUUCGUGGGUC	3028	GACCCACGAATTGTCAGCTCCCTTA	3632
1459	AGGGGAGCUGACAAUUCGUGGUCC	3029	GGACCCACGAATTGTCAGCTCCCTT	3633
1460	GGGAGCUGACAAUUCGUGGUCCG	3030	CGGACCCACGAATTGTCAGCTCCCT	3634
1462	GGAGCUGACAAUUCGUGGUCCGCA	3031	TGCGGACCCACGAATTGTCAGCTC	3635
1463	GAGCUGACAAUUCGUGGUCCGCAA	3032	TTGCGGACCCACGAATTGTCAGCTC	3636
1464	AGCUGACAAUUCGUGGUCCGCAAA	3033	TTTGGGACCCACGAATTGTCAGCT	3637
1465	GCUGACAAUUCGUGGUCCGCAAAA	3034	TTTTGGGACCCACGAATTGTCAGC	3638
1466	CUGACAAUUCGUGGUCCGCAAAAU	3035	ATTTTGGGACCCACGAATTGTCAG	3639
1467	UGACAAUUCGUGGUCCGCAAAAUUC	3036	GATTTTGGGACCCACGAATTGTCAG	3640
1468	GACAAUUCGUGGUCCGCAAAAUUCU	3037	AGATTTGGGACCCACGAATTGTCAG	3641
1469	ACAAUUCGUGGUCCGCAAAAUUCU	3038	AAGATTTGGGACCCACGAATTGTCAG	3642
1470	CAAUUCGUGGUCCGCAAAAUUCUUA	3039	TAAGATTTGGGACCCACGAATTGTCAG	3643
1471	AUUCGUGGUCCGCAAAAUUCUUA	3040	TTAAGATTTGGGACCCACGAATTGTCAG	3644
1472	AUUCGUGGUCCGCAAAAUUCUUAAC	3041	GTTAAGATTTGGGACCCACGAATTGTCAG	3645
1473	UUCGUGGUCCGCAAAAUUCUUAACU	3042	AGTTAAGATTTGGGACCCACGAATTGTCAG	3646
1474	UCGUGGUCCGCAAAAUUCUUAACUA	3043	TAGTTAAGATTTGGGACCCACGAATTGTCAG	3647
1475	CGUGGUCCGCAAAAUUCUUAACUAC	3044	GTAAGTTAAGATTTGGGACCCACGAATTGTCAG	3648
1476	GUGGUCCGCAAAAUUCUUAACUACC	3045	AGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3649
1477	UGGUCCGCAAAAUUCUUAACUACCU	3046	AGGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3650
1478	GGGUCCGCAAAAUUCUUAACUACCUA	3047	TAGGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3651
1479	GGUCCGCAAAAUUCUUAACUACCUAA	3048	TTAGGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3652
1480	GUCGCAAAAUUCUUAACUACCUAAU	3049	ATTAGGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3653
1481	UCCGCAAAAUUCUUAACUACCUAAUA	3050	TATTAGGTAGTTAAGATTTGGGACCCACGAATTGTCAG	3654

Input Sequence = PLN

Oligo Length = 25

PLN (Homo sapiens phospholamban (PLN) mRNA; 1635 bp)

Table 31

Table 31: Anti-Her2 Ribozyme and Substrate Sequence

RPI Nos	nt. Position	MCH Ribozyme Sequence	Seq ID Nos	NCH Substrate Sequence	Seq ID Nos
17214	175	asgsaauca cUGAuGagccguuagccGaa Iguagc B		GAGCAC A UGAGCU	
17215	212	gsaagsgcg cUGAuGagccguuagccGaa Igagag B		CUCCUC A CCCCUC	
17216	261	uacaaauagc cUGAuGagccguuagccGaa Iugccg B		CCGGAC A GACAGA	
17217	297	cscsaagsgug cUGAuGagccguuagccGaa Iucucg B		CCAGAC C CACUUG	
17218	381	ascsaagsgcu cUGAuGagccguuagccGaa Icauug B		CCAAUG C AGCCUG	
17219	619	cscsaauuca cUGAuGagccguuagccGaa Iauucu B		AGAGUC U UGAAAG	
17220	665	csgsaugsucc cUGAuGagccguuagccGaa Iuagca B		UGCUAC A GGACAG	
17221	943	uuusgaagag cUGAuGagccguuagccGaa Iaggcg B		CUCCUC C ACUCAA	
17222	944	gsuusaagag cUGAuGagccguuagccGaa Igagca B		UCCUCC A CUUAC	
17223	946	uagsgaungia cUGAuGagccguuagccGaa Iuggag B		CUCCAC U UCAACA	
17224	993	uagsuuagua cUGAuGagccguuagccGaa Iugaca B		UGGUAC C UACACA	
17225	997	uacsaugaug cUGAuGagccguuagccGaa Iuagug B		CACUAC A ACACGA	
17226	1000	gsaugsuacug cUGAuGagccguuagccGaa Iuugag B		CUACAC A CAGAC	
17227	1017	uagsgagcau cUGAuGagccguuagccGaa Iacuca B		UGAGUC C AUGCCA	
17228	1078	asgsaagag cUGAuGagccguuagccGaa Iuaggia B		UCCUAC A ACUACU	
17229	1201	asgaacacau cUGAuGagccguuagccGaa Icaacu B		AGUGUC U AUGUCU	
17230	1285	cauacaccaa cUGAuGagccguuagccGaa Iauucu B		GAAGUC U UUGGAG	
17231	1395	gsguasaacc cUGAuGagccguuagccGaa Iugauu B		AGAUAC A GCUUAC	
17232	1413	gacacaaugc cUGAuGagccguuagccGaa Iegaug B		ACUUC A GCAUGC	
17233	1450	asaggaauuc cUGAuGagccguuagccGaa Iucccg B		CUUGAC C AGUCUC	
17234	1624	aaagaaagcu cUGAuGagccguuagccGaa Iucccg B		CGSGGC A GAGUUC	
17235	1787	gacaaacucc cUGAuGagccguuagccGaa Igcccg B		ACUUC C UACUUC	
17236	2001	gacaaauag cUGAuGagccguuagccGaa Iaggug B		CUCCUC U ACUUGC	
17237	2002	gagcaaaugu cUGAuGagccguuagccGaa Igagag B		CUUGCC C AUCAUC	
17238	2055	asguuaugau cUGAuGagccguuagccGaa Iggaag B			

Table 31

17239	2056	csasgseuga	cUGAuGagcgcguuagccGaa	Iggscga B	UUGCCCC A UGACUG
17240	2068	csaagsgagu	cUGAuGagcgcguuagccGaa	Iggscga B	CUAGACC C ACUCUG
17241	2069	ascsasgag	cUGAuGagcgcguuagccGaa	Iggscga B	UUGACC A CUCCUG
17242	2095	csasgseguu	cUGAuGagcgcguuagccGaa	Iggscga B	CGAUCCC C AACGCU
17243	2051	asgsasgaca	cUGAuGagcgcguuagccGaa	Iggscga B	AAGUGC U UGACUG
17244	2373	uasgsaagac	cUGAuGagcgcguuagccGaa	Iggscga B	UUGGAC A GUUACA
17245	2570	csasasagc	cUGAuGagcgcguuagccGaa	Iggscga B	UGAGAC A GDUAGU
17246	2665	asuscsccu	cUGAuGagcgcguuagccGaa	Iggscga B	GAUUGCC A AGGGAU
17247	2702	genacsccu	cUGAuGagcgcguuagccGaa	Iggscga B	CUUGAC A CAGGAC
17248	2771	csasgagcc	cUGAuGagcgcguuagccGaa	Iggscga B	UUGGCG U GUCUGG
18261	2780	gsuscsagc	cUGAuGagcgcguuagccGaa	Iggscga B	GCUGGC U GUCUGG
17249	2783	asasgagcc	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18265	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18267	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18269	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18271	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18273	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18275	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18277	2783	asusgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18262	2788	uscsagcua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
17250	2799	gsasgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18263	2935	uasasgsuac	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
17251	2939	asuscsuua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18266	2939	uscsagcua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18268	2939	asuscsuua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18270	2939	uscsagcua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18272	2939	asuscsuua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18274	2939	uscsagcua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18276	2939	asuscsuua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18278	2939	uscsagcua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG
18264	2940	csasgsuua	cUGAuGagcgcguuagccGaa	Iggscga B	CGUGGC U GUCUGG

Table 31

17194	2003	gsgscsaug	cUGAuGagcgcguuaggccGaa	Aggagag B	CUUUCU A CAUGCCC
17205	2058	usgscsaugui	cUGAuGagcgcguuaggccGaa	Auggggc B	GCCCCAU C AACUGCA
17206	2072	csascsasacg	cUGAuGagcgcguuaggccGaa	Auggggu B	ACCCACU C CUGBBUG
17195	2352	csasgsasucc	cUGAuGagcgcguuaggccGaa	Agacacu B	AGUGGU U GGAUCUG
17196	2575	uasasgsesca	cUGAuGagcgcguuaggccGaa	Aagcugu B	ACAGCUU A UGCCCUA
17197	2697	usgsusgsuac	cUGAuGagcgcguuaggccGaa	Agcccca B	UGCGGU C GUACACA
18257	2776	asgsccsaagc	cUGAuGagcgcguuaggccGaa	Agccacc B	GUUGGU C GCUUGCU
18258	2790	uscsuacsugc	cUGAuGagcgcguuaggccGaa	Augucca B	UGACAU U GACGAGA
17207	2826	gscscscscac	cUGAuGagcgcguuaggccGaa	Agucauc B	GAUGACU U UUGGAGC
18259	2928	usgsjcscccc	cUGAuGagcgcguuaggccGaa	Aaagucca B	UGACUU U GGGGCCA
18260	2942	csccscauicg	cUGAuGagcgcguuaggccGaa	Agaguuu B	AAACCUU A CGAUGGG
17198	3089	asgsaactaac	cUGAuGagcgcguuaggccGaa	Acucccg B	CGGGACU U GUGUGUU
17208	3155	usgsjsgjacc	cUGAuGagcgcguuaggccGaa	Agucucc B	GAGGACU U GGGCCCA
17209	3499	csjgsesuugua	cUGAuGagcgcguuaggccGaa	Agggcug B	CAGCCCU C UACAGCG
17210	3501	asctcscgacug	cUGAuGagcgcguuaggccGaa	Agaggcg B	GCCTUCU A CAGCGGU
17211	3714	csusuuuagac	cUGAuGagcgcguuaggccGaa	Acocccau B	AUGGGGU C GUAAMAG
17199	3802	gsccasgsagag	cUGAuGagcgcguuaggccGaa	Agggugg B	CCACCUU C CUCCUGC
17200	3825	gsgeuuuaguc	cUGAuGagcgcguuaggccGaa	Aagcgug B	CAGGCUU C GACAAAC
17201	3838	uscsccsaagu	cUGAuGagcgcguuaggccGaa	Auagagg B	CCUCUAU U ACUGGGA

Lowercase = 2'-O-methyl Modifications

Uppercase = 1. Uppercase U under Ribozyme Sequence = 2'-C-Allyl U

Uppercase = 2. All other Uppercases = Ribonucleotides

I = Inosine

B = 3'-3' Inverted abasic deoxyribose

Table 32

Table 32: RNA Cleavage by NCH-XYLO Ribozyme
(Reaction: 50 mM TRIS-Cl pH 7.5, 10 mM Mg²⁺, 37°C, 500 nM FINAL [Rz], Trace Substrate)

DATA SUMMARY

NCH-Xylo Ribozyme (RPI No.)	TARGET TRIPLET 5'-NCX-3'	k _{obs} (min. ⁻¹) guua + A15.1 = xylo
14827	5'-GCA-3'	1.649
14828	5'-ACA-3'	0.293
14829	5'-UCA-3'	0.272
14830	5'-CCA-3'	0.214

Table 33

Table 33: Examples of NCH-Xylo Ribozyme and Substrate Sequences

RPI Nos.	Ribozyme Sequence	Seq. ID. Nos.	Substrate Sequence	Seq. ID. Nos.
14827	5'-ucu cca u cUGA uGA ggcc guua ggcc Gaa I cUC ccuB-3'		5'-AGGGA GCA AUGGAGA-3'	
14828	5'-ucu cca u cUGA uGA ggcc guua ggcc Gaa I uuc ccuB-3'		5'-AGGGA ACA AUGGAGA-3'	
14829	5'-ucu cca u cUGA uGA ggcc guua ggcc Gaa I auc ccuB-3'		5'-AGGGA UCA AUGGAGA-3'	
14830	5'-ucu cca u cUGA uGA ggcc guua ggcc Gaa I guc ccuB-3'		5'-AGGGA CCA AUGGAGA-3'	

Uppercase = Ribonucleotides

Lowercase = 2'-O-methyl nucleotides

I = Xylo-Inosine

B = 3'-3' inverted abasic

U = 2'-C-allyl-U

Table 34

Table 34: Anti-HER2 NCH Ribozyme and Target Sequences

nt. Position	NCH Substrate Sequence	Seq. ID Nos.	NCH Ribozyme Sequence	Seq. ID Nos.
14	AGGUAAC C CUGGCC		GGGCCAG CUGAUGAG X CGAA IUUACCU	
15	GGUAACC C UGGCCCC		GGGGCCA CUGAUGAG X CGAA IGUUACC	
16	GUAACCC U GGCCCCU		AGGGGCC CUGAUGAG X CGAA IGGUAC	
20	CCUGGCG C CUUUGG		CCAAAGG CUGAUGAG X CGAA ICCAGGG	
21	CCUGGCC C CUUUGGU		ACCAAAG CUGAUGAG X CGAA IGCCAGG	
22	CUGGCC C UUUUGU		GACCAA CUGAUGAG X CGAA IGGCCAG	
23	UGGCCCC U UUGGUG		CGACCAA CUGAUGAG X CGAA IGGCCA	
35	UCGGGCG C CGGGCA		UGCCCCG CUGAUGAG X CGAA ICCCGA	
36	CGGGGCC C CGGGCAG		CGCCCCG CUGAUGAG X CGAA IGCCCCG	
37	GGGGCCC C GGGCAGC		GCUGCCC CUGAUGAG X CGAA IGGCCCC	
42	CCCGGCG A GCGGCG		GGCGGCG CUGAUGAG X CGAA ICGCGG	
45	GGCGAGC C GCGGCC		GGCGGCG CUGAUGAG X CGAA ICGGCC	
52	CGCGGCG C CCUCCC		GGGAAGG CUGAUGAG X CGAA ICGCGG	
53	CGCGGCC C CUUCCA		UGGGAAG CUGAUGAG X CGAA ICGGCG	
54	CGCGGCC C UUCCAC		GUGGGAA CUGAUGAG X CGAA IGGCGG	
55	CGCGCCC U UCCACG		CGUGGGA CUGAUGAG X CGAA IGGCGG	
58	CCCUUUC C CAGGGG		CCCCGUG CUGAUGAG X CGAA IAAAGG	
59	CCCUUCC C ACGGGC		GCCCGU CUGAUGAG X CGAA IAAAGG	
60	CCUCCCC A CGGGCC		GGCCCCG CUGAUGAG X CGAA IGAAGG	
67	ACGGGC C CUUACU		AGUAAAG CUGAUGAG X CGAA ICCCGU	
68	GGGGGCC C UUUACU		CAGUAAA CUGAUGAG X CGAA IGCCCCG	
69	GGGGCCC U UUACUG		GCAGUAA CUGAUGAG X CGAA IGGCCC	
74	CCUUUAC U GCGCGC		GCGGCGC CUGAUGAG X CGAA IUAAAG	
79	ACUGGCG C GCGGCC		GGCGGCG CUGAUGAG X CGAA ICGCAGU	
86	GCGGCGC C CGGCC		GGGGCCG CUGAUGAG X CGAA ICGCGG	
87	GCGGCGC C GGGCCC		GGGGGCC CUGAUGAG X CGAA ICGCGG	
91	GCCCGGC C CCCACC		GGGUGG CUGAUGAG X CGAA ICGGGG	
92	CCCGGCC C CCACCC		GGGGUGG CUGAUGAG X CGAA ICGGGG	
93	CGGGGCC C CACCCU		AGGGUG CUGAUGAG X CGAA IGGCGG	
94	CGGCCCC C ACCCCU		GAGGGU CUGAUGAG X CGAA IGGCCG	
95	GGCCCCC A CCCUUG		CGAGGGG CUGAUGAG X CGAA IGGGGG	
97	CCCCCAC C CUUGCA		UGCGAGG CUGAUGAG X CGAA IGGGGG	
98	CCCCACC C CUUGCAG		CUUGGAG CUGAUGAG X CGAA IGGGGG	
99	CCACCCC C UCGAGC		GCUGCGA CUGAUGAG X CGAA IGGUGG	
100	CCACCCC U CGCAGCA		UGCUUGG CUGAUGAG X CGAA IGGUGG	
104	CCUUCG C GCACCC		GGGUGG CUGAUGAG X CGAA ICGAGG	
107	UCGAGC A CCGCGG		CGCGGG CUGAUGAG X CGAA ICGGCA	
109	CGAGCAC C CGCGCC		GGCGGG CUGAUGAG X CGAA IUGGCG	
110	CAGCAC C CGCGCC		GGCGGG CUGAUGAG X CGAA IUGGCG	
111	AGCACCC C GCGCCC		GGCGGG CUGAUGAG X CGAA IUGGCG	
116	CCCGGCG C CGCGCC		GGCGGG CUGAUGAG X CGAA ICGGGG	
117	CGCGGCC C CGCGCC		GGCGGG CUGAUGAG X CGAA ICGGGG	

Table 34

118	CGGCGCC C GCGCCU	AGGCGC CUGAUGAG X CGAA IGCGCG
123	CCGCGCC C CUCCCAG	CUGGAG CUGAUGAG X CGAA ICGCGG
124	CCGCGCC C UCCAGC	GCUGGA CUGAUGAG X CGAA IGCGCG
125	CGGCGCC U CCGAGC	GGCUGG CUGAUGAG X CGAA IGCGCG
127	CGGCGCC C CAGCCG	CCGCGC CUGAUGAG X CGAA IAGGGG
128	GCCCGCC C AGCCGG	CCGCGC CUGAUGAG X CGAA IAGGGG
129	CCCGCC C GCCGGU	ACCGGC CUGAUGAG X CGAA IAGGGG
132	UCCCGC C GGGUCC	UGAGCC CUGAUGAG X CGAA ICUGGA
138	CCGGGC C AGCGGA	UCCGCG CUGAUGAG X CGAA IACCGG
139	CGGCGCC A GCCGGG	CUCGCG CUGAUGAG X CGAA IGACCG
142	GCGCGC C GGAGCC	UGCGCC CUGAUGAG X CGAA ICUGGAC
148	CCGCGC C AUGGGC	GCCCGC CUGAUGAG X CGAA ICUGCG
149	CGGAGCC A UGGGGC	GGCGCC CUGAUGAG X CGAA IGCGCG
156	AUGGGC C GGAGCC	CGCGCC CUGAUGAG X CGAA ICUGCG
162	CCGAGC C GCAGUA	UCACGC CUGAUGAG X CGAA ICUGCG
165	GAGCGC A GUGAGA	UGCUCG CUGAUGAG X CGAA IGCGCG
172	AGGAGC A CCAUGA	UCCAGC CUGAUGAG X CGAA ICUCACU
174	UGAGCG C AUGGAG	GCUCAG CUGAUGAG X CGAA IUGUCA
175	GAGCAG C UGGAGU	AGCUGC CUGAUGAG X CGAA IGCGCG
182	AUGGAG U GCGGCC	GGCGCC CUGAUGAG X CGAA ICUGCG
189	UGCGGC C UUGGCG	GGCAGA CUGAUGAG X CGAA ICUGCG
190	GCGGCC U UGUGCG	GGCAGA CUGAUGAG X CGAA IGCGCG
196	CUUGGC C GCGGGG	CCCGCG CUGAUGAG X CGAA ICACAG
199	GUGCGC U GGGGGU	AGCGCC CUGAUGAG X CGAA ICUGCG
206	UGGGGC U CCUCUC	GAGGAG CUGAUGAG X CGAA ICUGCG
208	GGGCGC C UCCUCG	GCGAGG CUGAUGAG X CGAA IAGCGC
209	GGGCGC U CCUCGC	GCGAGG CUGAUGAG X CGAA IAGCGC
211	GCUCUC C UCGCCU	AGGCGC CUGAUGAG X CGAA IAGGAG
212	CUCUCU U CGCCUC	GAGGCG CUGAUGAG X CGAA IAGGAG
216	UCCUGC C CUCUGC	GCAAGG CUGAUGAG X CGAA ICGAGG
217	CCUCGC C UCUUGC	GGCAGA CUGAUGAG X CGAA ICGAGG
218	CUCGCC U CUUGCC	GGGAGG CUGAUGAG X CGAA IGGGAG
220	CGCCUC U UGCCCG	GGGGGA CUGAUGAG X CGAA IAGGCG
224	CUCUGC C CCGCGA	UCCGGG CUGAUGAG X CGAA ICAAGG
225	UCUUGC C CCGGAG	CUCGGG CUGAUGAG X CGAA ICAAGG
226	CUUGCC C CCGAGC	GCUCGG CUGAUGAG X CGAA IGGGAG
227	UGCGCC C CGAGCC	GGCUGG CUGAUGAG X CGAA IGGGAG
228	UGCGCC C GGAGCG	GGGCGC CUGAUGAG X CGAA IGGGAG
234	CCGAGC C GCGAGC	UGCUGC CUGAUGAG X CGAA ICUGCG
241	CCGAGC A CCAAGU	ACUUGG CUGAUGAG X CGAA ICUGCG
243	CGAGCG C CAAGUGU	ACACUG CUGAUGAG X CGAA IUGGUG
244	GAGCAG C AAGUGU	CACACU CUGAUGAG X CGAA IUGGUG
245	AGCACCC A AGUGUG	GCACAC CUGAUGAG X CGAA IGGGUG
253	AGUGGC A CCGGAC	GUGCGG CUGAUGAG X CGAA ICACAC
255	UGUGCG C GCGAGC	CUGGCG CUGAUGAG X CGAA IUGGAG
259	CACCGG C CAGACU	AUGGUG CUGAUGAG X CGAA ICUGGUG
261	CGGCGC A GACAUG	UCAGUG CUGAUGAG X CGAA IUGGCG

Table 34

265	CACAGAC A UGAAGCU		AGCUUCA CUGAUGAG X CGAA IUCUGUG	
272	AUGAAGC U GCGGCU		GAGCCGC CUGAUGAG X CGAA ICUUCAU	
278	CUGCGGC U CCCUGCC		GGCAGGG CUGAUGAG X CGAA TCCGAG	
280	GCGGCU C CUGCCAG		CUGGCGC CUGAUGAG X CGAA TAGCCGC	
281	CGGCUCC C UGCCAGU		ACUGGCA CUGAUGAG X CGAA IGAGCCG	
282	GGCUCUU U GCGAGUC		GACUGGC CUGAUGAG X CGAA TGGAGCC	
285	UCCUUGC C AGUCCCG		CGGGACU CUGAUGAG X CGAA TACGGGA	
286	CCUGCCG A GUCCCGA		UCGGGAC CUGAUGAG X CGAA TCGAGGG	
290	GCCAGUC C CGAGACC		GGUCUGG CUGAUGAG X CGAA TACUGGC	
291	CCAGUCC C GAGACCC		GGGUCUC CUGAUGAG X CGAA TACUGGG	
297	CCGAGAC C CACUUGG		CCAGGUG CUGAUGAG X CGAA TUCUGCG	
298	CGAGACC C ACCUGGA		UCCAGGU CUGAUGAG X CGAA TUCUGUC	
299	GAGACCC A CCUGGAC		GUCCAGG CUGAUGAG X CGAA TGGUCUC	
301	GACCCAC C UGGACAU		AUGUCCA CUGAUGAG X CGAA TUGGGUC	
302	ACCCACC U GGAUCAU		CAUGUCC CUGAUGAG X CGAA TUGGGUG	
307	CCUGGAC A UGUCCCG		CGGAGCA CUGAUGAG X CGAA TUCCAGG	
311	GACUUGC U CGCCAC		GUGCGG CUGAUGAG X CGAA TCAUGUC	
313	CAUGCUC C GCCACCU		AGGUGGC CUGAUGAG X CGAA TAGCAUG	
316	GCUCGCC C ACCUCUA		UAGAGGU CUGAUGAG X CGAA TCGAGGC	
317	CUCGCC C A CCUCUAC		GUAGAGG CUGAUGAG X CGAA TCGGAGG	
319	CGCCAC C UCUACCA		UGGUAGA CUGAUGAG X CGAA TUGGCGG	
320	CGCCACC U CUACAG		CUGGUAG CUGAUGAG X CGAA TUGGGCG	
322	CCACCUC U ACCAGGG		CCUGGU CUGAUGAG X CGAA TAGGGUG	
325	CCUCUAC C AGGGCUG		CAGCCCU CUGAUGAG X CGAA TUAGAGG	
326	CUCUACC A GGGCUGC		GCAGCCC CUGAUGAG X CGAA TUGAGGU	
331	CCAGGGC U GCCAGGU		ACCUGGC CUGAUGAG X CGAA TCCUGGG	
334	GGGCGGC C AGGUGGU		ACCACCU CUGAUGAG X CGAA TACGCCC	
335	GGCUGCC A GGUUGUG		CACCAAC CUGAUGAG X CGAA TGCAGCC	
344	GUGGUGC A GGAAGAC		GUUUCU CUGAUGAG X CGAA TACCCAC	
352	GGGAAC C UGGAACU		AGUJCCA CUGAUGAG X CGAA TUUUCU	
353	GGAAACC U GGAACUC		GAGUJCC CUGAUGAG X CGAA TGUUJCC	
359	CUGGAAC U CACCUAC		GUAGGUG CUGAUGAG X CGAA TUUCCAG	
361	GGAAAC C CUUACCU		AGGUAGG CUGAUGAG X CGAA TAGUJCC	
363	AACUCAC C UACCGUC		GCAGGUA CUGAUGAG X CGAA TUGAGGU	
364	ACUCACC U ACCUGCC		GGCAGGU CUGAUGAG X CGAA TUGAGGU	
367	CACCUAC C UGCCAC		GUGGCA CUGAUGAG X CGAA TUAGGUG	
368	ACCUACC U GCCACC		GUUGGGC CUGAUGAG X CGAA TUGAGGU	
371	UACCGUC C CACCAU		AUUGGUG CUGAUGAG X CGAA TACGGUA	
372	ACCUGCC C ACCAUG		CAUUGGU CUGAUGAG X CGAA TGCAGGU	
373	CCUGCCC A CCAUUGC		GCAUUGG CUGAUGAG X CGAA TGGCAGG	
375	UGCCAC C AAUGCCA		UGGCAU CUGAUGAG X CGAA TUGGGCA	
376	GCCACC A AUGCCAG		CUGGCAU CUGAUGAG X CGAA TUGGGGC	
381	CCAUGC C AGCCUGU		ACAGGCU CUGAUGAG X CGAA TCAUUGG	
382	CAUUGCC A GCUUGUC		GACAGGC CUGAUGAG X CGAA TCAUUGG	
385	UGCCAGC C UGUCUU		AAGGACA CUGAUGAG X CGAA TCGGCA	
386	GCCAGCC U GUCCUUC		GAAGGAC CUGAUGAG X CGAA TCGUGGC	
390	GCCUGUC C UUCUGC		GCAGGAA CUGAUGAG X CGAA TACAGGC	

Table 34

391	CCUGUCC U UCCUGCA	UGCAGGA CUGAUGAG X CGAA IGACAGG	
394	GUCCUUC C UGCAGGA	UCCUGCA CUGAUGAG X CGAA IAAAGGAC	
395	UCCUUCU U GCAGGAU	AUCCUCC CUGAUGAG X CGAA IGAGGAA	
398	UUCUUCG A GGAUUC	GAUUAUC CUGAUGAG X CGAA ICAGGAA	
406	GGAUUUC C AGGAGGU	ACCUCU CUGAUGAG X CGAA IAUUUC	
407	GAUUAUC A GGAGGU	CACCUCC CUGAUGAG X CGAA IGUAUUC	
416	GAGGUCC A GGGUAC	GUAGCCC CUGAUGAG X CGAA ICACUCC	
421	GCAAGGC U ACGUGCU	AGCAGCU CUGAUGAG X CGAA ICCUCCG	
428	UACGUGC U CAUCGCU	AGCGAUG CUGAUGAG X CGAA ICACGUA	
430	CGUGGUC A UCGUCA	UGAGCGA CUGAUGAG X CGAA IAGCAG	
435	UCAUGGC U CACAACC	GGUUGUG CUGAUGAG X CGAA ICGAUGA	
437	AUCGUCU A CAACCA	UUGGUGU CUGAUGAG X CGAA IAGCGAU	
439	CGUCUAC A ACCAAGU	ACTUGGU CUGAUGAG X CGAA IUGAGCG	
442	UCACAAC C AAGUGAG	CUCAUUC CUGAUGAG X CGAA IUUGUGA	
443	CACAACC A AGUAGG	CCUCAU CUGAUGAG X CGAA IUUGUGU	
452	GUGAGGC A GGUCCCA	UGGGAAC CUGAUGAG X CGAA ICUCUAC	
457	GCAAGUC C CACUGCA	UGCAGUG CUGAUGAG X CGAA IACCUCC	
458	CAGGUCC C ACUGCAG	CUGCAGU CUGAUGAG X CGAA IGACCUU	
459	AGGUCC A CUGCAGA	UUCGAG CUGAUGAG X CGAA IGGACU	
461	GUCCUCC U GCAGAGG	CCUCUCC CUGAUGAG X CGAA IUGGAC	
464	CCACUGC A GAGGUG	CAGCCUC CUGAUGAG X CGAA ICAGUGG	
470	CAGAGGC U GGGGAU	AAUCCGC CUGAUGAG X CGAA ICUCUUG	
487	GCGAGGC A CCGAGCU	AGCUGGG CUGAUGAG X CGAA ICUCUCC	
489	GAGGCAC C CAGCUCU	AGAGCUG CUGAUGAG X CGAA IUGCCUC	
490	AGGCACC C AGCUCU	AAAGAGU CUGAUGAG X CGAA IUGCCUC	
491	GGCACC C GCUCUUU	AAAGAGC CUGAUGAG X CGAA IGGUGCC	
494	ACCACG U CUUUGAG	CUCAAAG CUGAUGAG X CGAA ICUGGGU	
496	CCAGCUC U UUGAGGA	UCCUCA CUGAUGAG X CGAA IAGCUGG	
505	UGAGGAC A ACUAUGC	GCAUAGU CUGAUGAG X CGAA IUCCUCA	
508	GGACAAC U AUGCCCU	AGGCAU CUGAUGAG X CGAA IUUGUCC	
513	ACUAUGC C CUGGCCG	CGGCCAG CUGAUGAG X CGAA ICUAUAG	
514	CUAUGCC C UGGCCGU	ACGGCCA CUGAUGAG X CGAA IGCAUAG	
515	UAUGGCC U GGCGUG	CACGGCC CUGAUGAG X CGAA IGGCAUA	
519	CCUGGCC C GUGCUG	CUAGCAC CUGAUGAG X CGAA ICCAGGG	
524	GCCUGUC U AGACAUA	AUUGUCU CUGAUGAG X CGAA ICACGAC	
529	GCUAGAC A AUGGAGA	UUCCAU CUGAUGAG X CGAA IUUAGAC	
538	UGGAGAC C CGCUGAA	UUCAGCG CUGAUGAG X CGAA IUUCUCA	
539	GGAGACC C GCUGAAC	GUUCAGC CUGAUGAG X CGAA IGUCUCC	
542	GACCGGC U GAACAUA	AUUGUUC CUGAUGAG X CGAA ICUGGUC	
547	GCUGAAC A AUACCA	GUGGUUA CUGAUGAG X CGAA IUUCAGC	
552	ACAUAAC C ACCCCUG	CAGGGGU CUGAUGAG X CGAA IUAUUGU	
553	CAUAACC A CCCCUGU	ACAGGGG CUGAUGAG X CGAA IGUAUUG	
555	AUACCAC C CCUCUCA	UGACAGG CUGAUGAG X CGAA IUGGUUA	
556	UACCAAC C CUGUCAC	GUGCAGC CUGAUGAG X CGAA IUGGUUA	
557	ACCACCC C UGUACA	UGUGACA CUGAUGAG X CGAA ICGUGGU	
558	CCACCCC U GUCACAG	CUGGAC CUGAUGAG X CGAA IGGUGG	
562	CCUGUCC A CAGGGC	GCCCCUG CUGAUGAG X CGAA IACAGG	

Table 34

564	CUGUCAC A GGGGCCU		AGGCCCC CUGAUGAG X CGAA IUGACAG	
570	CAGGGGC C UCCCCAG		CUGGGGA CUGAUGAG X CGAA ICCCCUG	
571	AGGGGCC U CCCCAGG		CCUGGGG CUGAUGAG X CGAA IGCCCCU	
573	GGGCUC C C CAGGAG		CUCCUGG CUGAUGAG X CGAA IAGGCC	
574	GGCCUCC C CAGGAGG		CCUCUGG CUGAUGAG X CGAA IAGGGCC	
575	GCCUCCC C AGGAGGC		GCCUCCU CUGAUGAG X CGAA IGGAGGC	
576	CCUCCCC A GGAGGCC		GGCCUCC CUGAUGAG X CGAA IGGGAGG	
583	AGGAGGC C UGCGGGA		UCCGCGA CUGAUGAG X CGAA ICCUCCU	
584	GGAGGCC U GCGGGAG		CUCCCGC CUGAUGAG X CGAA IGCCUCC	
593	CGGAGGC U GCAGCUU		AAGCUGC CUGAUGAG X CGAA ICUCCCC	
596	GAGCUGC A GCUUCGA		UCGAAGC CUGAUGAG X CGAA ICAGCUC	
599	CUGCAGC U UCGAAGC		GCUUCGA CUGAUGAG X CGAA ICUGCAG	
607	UCGAAGC C UCACAGA		UCUGUGA CUGAUGAG X CGAA ICUCUGA	
608	CGAAGCC U CACAGAG		CUCUGUG CUGAUGAG X CGAA IGCUCUG	
610	AGCCUC A CAGAGAU		AUCUCUG CUGAUGAG X CGAA IAGGCUU	
612	GCUCAC A GAGAUUC		AGAUCUC CUGAUGAG X CGAA IUGAGGC	
619	AGAGAU C UGAAGG		CCUUUCA CUGAUGAG X CGAA IAUUCUC	
634	AGGGGUC U UGAUCCA		UGGAUCA CUGAUGAG X CGAA IACCCCU	
640	CUUGAUC C AGCGGAA		UUCCGCU CUGAUGAG X CGAA IAUCAAG	
641	UUGAUCC A GCGGAAC		GUUCCGC CUGAUGAG X CGAA IGAUCAA	
649	GCGGAAC C CCCAGCU		AGCUGGG CUGAUGAG X CGAA IUUCCGC	
650	CGGAACC C CCAGCUC		GAGCUGG CUGAUGAG X CGAA IGUUCCG	
651	GGAAACC C CAGCUCU		AGAGCUG CUGAUGAG X CGAA IGGUUCU	
652	GAACCCC C AGCUCUG		CAGAGCU CUGAUGAG X CGAA IGGGUUC	
653	AACCCCC A GCUUCUG		GCGAGGC CUGAUGAG X CGAA IGGGGUU	
656	CCCCAGC U CUGCUAC		GUAGCAG CUGAUGAG X CGAA ICUGGGG	
658	CCAGCUC U GCUACCA		UGGUAGC CUGAUGAG X CGAA IAGCUGG	
661	GCUCUCC U ACCAGGA		UCCUGGU CUGAUGAG X CGAA ICAGAGC	
664	CUGCUAC C AGGACAC		GUGUCCU CUGAUGAG X CGAA IUAGCAG	
665	UGCUACC A GGACACG		CGUGUCC CUGAUGAG X CGAA IUGAGCA	
670	CCAGGAC A CGAUUUU		AAAAUCC CUGAUGAG X CGAA IUCCUGG	
688	GAAGGAC A UCUCUCCA		UGGAAGA CUGAUGAG X CGAA IUCCUUC	
691	GAACUAC U UCCACAA		UUGUGGA CUGAUGAG X CGAA IAUUGCC	
694	CAUCUUC C ACAAGAA		UUUUUGU CUGAUGAG X CGAA IAAAGUG	
695	AUCUUC C CAAGAAC		GUUCUUG CUGAUGAG X CGAA IGAAGAU	
697	CUUCCAC A AGAACAA		UUGUUCU CUGAUGAG X CGAA IUGGAAG	
703	CAAGAAC A ACCAGCU		AGCUGGU CUGAUGAG X CGAA IUUCUUG	
706	GAACAC C AGCUGGC		GCCAGCU CUGAUGAG X CGAA IUUGUUC	
707	AACAACC A GCUGGCU		AGCCAGC CUGAUGAG X CGAA IGUUGUU	
710	AACGAGC U GGCUCUC		GAGAGCC CUGAUGAG X CGAA ICUGGUU	
714	AGCUGGC U CUCACAC		GUUGAGG CUGAUGAG X CGAA ICCAGCU	
716	CUGGCUC U CACACUG		CAGUUGG CUGAUGAG X CGAA IAGCCAG	
718	GGCUCUC A CACUGAU		AUCAGUG CUGAUGAG X CGAA IAGAGCC	
720	CUCUCAC A CUGAUG		CUAUCAG CUGAUGAG X CGAA IUGAGAG	
722	CUCACAC U GAUAGAC		GUUUAUC CUGAUGAG X CGAA IUUGUAG	
730	GAUAGAC A CCAACCG		CGGUUGG CUGAUGAG X CGAA IUUUAUC	
732	UAGACAC C AACCGCU		AGCGGUU CUGAUGAG X CGAA IUGUCUA	

Table 34

733	AGACACC A ACCGCUC		GAGCGGU CUGAUGAG X CGAA IGUGUCU	
736	CACCAAC C GCUUCUG		CGAGAGC CUGAUGAG X CGAA IUUGUGU	
739	CAACCGC U CUCGGGC		GCCCCAG CUGAUGAG X CGAA ICGGUGU	
741	ACCGCUC U CGGGCCU		AGGCCCG CUGAUGAG X CGAA IAGCGGU	
747	CUCGGGC C UGCCACC		GGUGGCA CUGAUGAG X CGAA ICCCGAG	
748	UCGGGCC U GCCACCC		GGGUGGC CUGAUGAG X CGAA IGGCCGA	
751	GGCCUCG C ACCCCUG		CAGGGGU CUGAUGAG X CGAA ICAGGCC	
752	CGCUGCC A CCCCUGU		ACAGGGG CUGAUGAG X CGAA IGCAGGC	
754	CUGCCAC C CCUGUUC		GAACAGG CUGAUGAG X CGAA IUGGCAG	
755	UGCCACC C CUGUUCU		AGAACAG CUGAUGAG X CGAA IUUGGCA	
756	GCCACCC C UGUUCUC		GAGAACA CUGAUGAG X CGAA IGGUGGC	
757	CCACCCC U GUUCUCC		GGAGAAC CUGAUGAG X CGAA IGGUGGG	
762	CGUUCU C CCGAUGU		ACAUCGG CUGAUGAG X CGAA IAAACGG	
764	UGUUCUC C GAUGUGU		ACACAUC CUGAUGAG X CGAA IAGAACA	
778	UAAAGGC U CCCGUGU		CAGCGGG CUGAUGAG X CGAA ICCCUUA	
780	AGGCUC C CGUCUGU		AGCAGCG CUGAUGAG X CGAA IAGCCCU	
781	GGGCUC C CGUCUGU		CAGCAGC CUGAUGAG X CGAA IAGCCCC	
784	CUCCCGC U GCGUGGG		CCCCAGC CUGAUGAG X CGAA ICGGGAG	
787	CCGCUCG U GGGGAGA		UCUCCCC CUGAUGAG X CGAA ICAGCGG	
801	AGAGUUC U GAGGAUU		AAUCCUC CUGAUGAG X CGAA IAAUCUU	
812	GAUUGUC A GAGCCUG		CAGGCUC CUGAUGAG X CGAA IACAAUC	
817	UCAGAGC C UGACGCG		CGCGUCA CUGAUGAG X CGAA ICUUGUA	
818	CAGAGCC U GACGCGC		CGCGCUC CUGAUGAG X CGAA IGCUCUG	
826	GACGCGC A CUGUCUG		CAGACAG CUGAUGAG X CGAA ICGCGUC	
828	CGCGCAC U GUCUGUG		CACAGAC CUGAUGAG X CGAA IUGCGCG	
832	CACUGUC U GUGCCGG		CCGGCAC CUGAUGAG X CGAA IACAGUG	
837	UCUGUGC C GGUUGGU		AGCCACC CUGAUGAG X CGAA ICACAGA	
844	CGGUUGC U GUGCCCG		CGGGCAC CUGAUGAG X CGAA ICCACCG	
849	GCUGUGC C CGCUGCA		UGCAGCG CUGAUGAG X CGAA ICACAGC	
850	CUGUGCC C GCUGCAA		IUGCAGC CUGAUGAG X CGAA IGCACAG	
853	UGCCCGC U GCAAGGG		CCCUUGC CUGAUGAG X CGAA ICGGGCA	
856	CGCGUC A AGGGGCC		GGCCCCU CUGAUGAG X CGAA ICAGCGG	
863	ANGGGC C ACUGCCC		GGGCAGU CUGAUGAG X CGAA ICCCCUU	
864	AGGGGCC A CUGCCCA		UGGGCAG CUGAUGAG X CGAA IGGCCCU	
866	GGGCCAC U GCCACU		AGUGGGC CUGAUGAG X CGAA IUGGCCC	
869	CCACUGC C CACUGAC		GUCAGUG CUGAUGAG X CGAA ICAGUGG	
870	CACUGCC C ACUGACU		AGUCAGU CUGAUGAG X CGAA IGCAGUG	
871	ACUGCCC A CUGACUG		CAGUCAG CUGAUGAG X CGAA IGGCAGU	
873	UGCCCAC U GACUGCU		AGCAGUC CUGAUGAG X CGAA IUGGGCA	
877	CACUGAC U GCUGCCA		UGGCAGC CUGAUGAG X CGAA IUCAGUG	
880	UGACUGC U GCCAUGA		UCAUGGC CUGAUGAG X CGAA ICAGUCA	
883	CUCUGC C AUGAGCA		UGCUCAU CUGAUGAG X CGAA ICAGCAG	
884	UGCUGCC A UGAGCAG		CUGCUCA CUGAUGAG X CGAA IGCAGCA	
890	CAUGAGC A GUGUGCU		AGCACAC CUGAUGAG X CGAA ICUCAUG	
897	AGUGUGC U GCCCGCU		AGCCGCG CUGAUGAG X CGAA ICACACU	
900	GUGUCGC C GGCUGCA		UGCAGCC CUGAUGAG X CGAA ICAGCAC	
904	UGCCGGC U GCACGGG		CCCGUGC CUGAUGAG X CGAA ICCGGCA	

Table 34

907	CGGCUGC A CGGCCCC	GGGCCCC CUGAUGAG X CGAA ICAGCCG
913	CACGGGC C CCAAGCA	UGCUUG CUGAUGAG X CGAA ICCUGUG
914	ACGGGCC C CAAGCAC	GUUCUUG CUGAUGAG X CGAA IGCCCGU
915	CGGGCCC C AAGCACU	AGUGCUU CUGAUGAG X CGAA IGGCCCC
916	GGGGCCC A AGCACUC	GAGUGCU CUGAUGAG X CGAA IGGGCC
920	CCCAAGC A CUCUGAC	GUCAGAG CUGAUGAG X CGAA ICUGUGG
922	CAAGCAC U CUGACUG	CAGUCAG CUGAUGAG X CGAA IUGCUUG
924	AGCACUC U GACUGUC	GGCAGUC CUGAUGAG X CGAA IAGUGCU
928	CUCUGAC U GGCUGGC	GCCAGGC CUGAUGAG X CGAA IUCAGAG
931	UGACUGC C UGGCCUG	CAGGCCA CUGAUGAG X CGAA ICAGUCA
932	GACUGCC U GGCUGGC	GCAAGCC CUGAUGAG X CGAA IGACUGC
936	GCCUGGC C UGGCUCC	GGAGGCA CUGAUGAG X CGAA ICCAGGC
937	CCUGGCC U GCCUCCA	UGGAGCC CUGAUGAG X CGAA IGCCAGG
940	GGCCUGC C UCCACU	AAGUGGA CUGAUGAG X CGAA ICAGGCC
941	GCCUGCC U CCACUUC	GAGUGGC CUGAUGAG X CGAA IGACAGC
943	CUGCCUC C ACUUCAA	UUGAAGU CUGAUGAG X CGAA IAGGCAG
944	UGCCUCC A CUUACAC	GUUGAAG CUGAUGAG X CGAA IGAGGCA
946	CCUCCAC U UCAACCA	UGGUUGA CUGAUGAG X CGAA IUGAGAG
949	CCAUCUC A ACCACAG	CUGUGGU CUGAUGAG X CGAA IAGUGG
952	CUUACAC C ACAGUGG	CCACUGU CUGAUGAG X CGAA IUUGAAG
953	UUCAACC A CAGUGGC	GCCACUG CUGAUGAG X CGAA IUGUGAA
955	CAACCAC A GUGGCAU	AUGCCAC CUGAUGAG X CGAA IUGUGUG
961	CAGUGGC A UCUGUGA	UCACAGA CUGAUGAG X CGAA ICCACUG
964	UGGCAUC U GUGAGCU	AGCUCAC CUGAUGAG X CGAA IAGGCCA
971	UGUGAGC U GCACUGC	GCAGUGC CUGAUGAG X CGAA ICUCACA
974	GAGCUGC A CUGCCCA	UGGCGAG CUGAUGAG X CGAA ICAGCUC
976	GCUGCAC U GCCCAGC	GCUGGGC CUGAUGAG X CGAA IUGCAGC
979	GCACUGC C CAGCCCU	AGGGCUG CUGAUGAG X CGAA ICAGUGC
980	CACUGCC C AGCCCU	CAGGGCU CUGAUGAG X CGAA IGACAGU
981	ACUGCCC A GCCCUGG	CCAGGGC CUGAUGAG X CGAA IGCCAGU
984	GCCAGC C CUGGUCA	UGACCAG CUGAUGAG X CGAA ICUGGCC
985	CCAGGCC C UGGUCAC	GUGACCA CUGAUGAG X CGAA IUGUGG
986	CCAGCCC U GGUACAC	GGUGACC CUGAUGAG X CGAA IGCUGG
991	CCUGGUC A CCUACAA	UUGUAGG CUGAUGAG X CGAA IACCAGG
993	UGGUAC C UACACAA	UGUUGUA CUGAUGAG X CGAA IUGACCA
994	GGUCACC U ACACAC	GUGUGU CUGAUGAG X CGAA IUGUACC
997	CACCUAC A ACACAGA	UCUGUGU CUGAUGAG X CGAA IUAGGUG
1000	CUACAA C CAGACAC	GUGUCUG CUGAUGAG X CGAA IUUGUAG
1002	ACAACAC A GACACGU	ACGUGUC CUGAUGAG X CGAA IUGUGU
1006	CACAGAC A CGUUGA	UCAAACG CUGAUGAG X CGAA IUCUGUG
1017	UGAGUCC C AUGCCCA	UGGGCAU CUGAUGAG X CGAA IACUCAA
1018	UAGUCC C UGCCCAA	UUGGGCA CUGAUGAG X CGAA IGAUUA
1022	UCAAUGC C CAUCCCC	GGGAUUG CUGAUGAG X CGAA ICAUGGA
1023	CAUUGCC C AAUCCCG	CGGGAU CUGAUGAG X CGAA IGCAUGG
1024	CAUGCCC C AUCCCGA	UCCGGAU CUGAUGAG X CGAA IGGCAUG
1028	CCCAUCC C CAGGGGC	GCCUCC CUGAUGAG X CGAA IAUUGGG
1029	CCAAUCC C GAGGGCC	GGCCUCC CUGAUGAG X CGAA IGAUUGG

Table 34

1036	CGAGGGC	C	GGUAUAC			GUUAUACC	CUGAUGAG	X	CGAA	ICCCUCCG	
1044	GGUAUAC	A	UUCGGCG			CGCCGAA	CUGAUGAG	X	CGAA	IUAUACC	
1053	UCGGCGC	C	AGCUGUG			CACAGCU	CUGAUGAG	X	CGAA	ICGCCGA	
1054	CGCGGCC	A	GCUGUGU			ACACAGC	CUGAUGAG	X	CGAA	IGCGCCG	
1057	GGCCAGC	U	GUUGGAC			GUCACAC	CUGAUGAG	X	CGAA	ICUGGGC	
1065	GUUGAGC	U	GCCUGUC			GACAGGC	CUGAUGAG	X	CGAA	IUCACAC	
1068	UGACUGC	C	UGUCCCU			AGGGACA	CUGAUGAG	X	CGAA	ICAGUCA	
1069	GACUGCC	U	GUCCCUA			UAGGGAC	CUGAUGAG	X	CGAA	ICGAGUC	
1073	GCCUGUC	C	CUACAC			GUUGUAG	CUGAUGAG	X	CGAA	IACAGGC	
1074	CCUGUCC	C	UACAAUC			AGUUGUA	CUGAUGAG	X	CGAA	IGACAGG	
1075	CCUGUCC	U	ACAACUA			UAGUUGU	CUGAUGAG	X	CGAA	IGGACAG	
1078	UCCCUAC	A	ACUACCU			AGGUAGU	CUGAUGAG	X	CGAA	IUAGGGA	
1081	CUACAAU	U	ACCUUUC			GAAAGGU	CUGAUGAG	X	CGAA	IUUGUAG	
1084	CAACUAC	C	UUCUAC			GUAGAAA	CUGAUGAG	X	CGAA	IUAGUUG	
1085	AACUACC	U	UUCUACG			CGUAGAA	CUGAUGAG	X	CGAA	IUGAGUU	
1089	ACCUUUC	U	ACGGAGC			CGUCCGU	CUGAUGAG	X	CGAA	IAAAGGU	
1104	UGGGAUC	C	UGCACCC			GGGUGCA	CUGAUGAG	X	CGAA	IAUCCCA	
1105	GGGAUCC	U	GCACCCU			AGGGUGC	CUGAUGAG	X	CGAA	IGAUCCC	
1108	AUCCUGC	A	CCUCUGU			ACGAGGG	CUGAUGAG	X	CGAA	ICAGGAU	
1110	CCUGCAC	C	CUCGUCU			AGACGAG	CUGAUGAG	X	CGAA	IUGCAGG	
1111	CUGCACCC	C	UCGUCUG			CAGACGA	CUGAUGAG	X	CGAA	IGUGCAG	
1112	UGCACCC	U	CGUCUGC			GCAGACG	CUGAUGAG	X	CGAA	IGGUGCA	
1117	CCUCGUC	U	GCCCCCU			AGGGGGC	CUGAUGAG	X	CGAA	IACGAGG	
1120	CGUCUGC	C	CCUCGCA			UGCAGGG	CUGAUGAG	X	CGAA	ICAGACG	
1121	GUUCGCC	C	CCUGCAC			GUGCAGG	CUGAUGAG	X	CGAA	IGCAGAC	
1122	UCUGCCC	C	CUGCACA			UGUGCAG	CUGAUGAG	X	CGAA	IGGCAGA	
1123	CUGCCCC	C	UGCACA			IUGUGCA	CUGAUGAG	X	CGAA	IGGGCAG	
1124	UGCCCCC	U	GCACAAC			GUUGUGC	CUGAUGAG	X	CGAA	IGGGCA	
1127	CCCCUGC	A	CAACCAA			UUGGUUG	CUGAUGAG	X	CGAA	ICAGGGG	
1129	CCUGCAC	A	ACCAAGA			UCUUGGU	CUGAUGAG	X	CGAA	IUGCAGG	
1132	GCACAAC	C	AAGAAGU			ACCUCUU	CUGAUGAG	X	CGAA	IUUGUGC	
1133	CACAACC	A	AGAGGUG			CACCUUU	CUGAUGAG	X	CGAA	IUGUGUG	
1143	AGGUGAC	A	GCAGAGG			CCUCUGC	CUGAUGAG	X	CGAA	IUCACCU	
1146	UGACAGC	A	GAGGAUG			CAUCCUC	CUGAUGAG	X	CGAA	ICUGUCA	
1158	AUGGAAC	A	CAGCGGU			ACCGCUG	CUGAUGAG	X	CGAA	IUUCCAU	
1160	GGAACAC	A	GCGGUGU			ACACGCG	CUGAUGAG	X	CGAA	IUKUCCU	
1177	GGAAGUC	A	GCAAGCC			GGCUGUC	CUGAUGAG	X	CGAA	ICACTUC	
1180	GUUGCAG	A	AGCCCGC			CAGGGCU	CUGAUGAG	X	CGAA	ICUGCAC	
1184	AGCAAGC	C	CUGUGCC			GGCACAG	CUGAUGAG	X	CGAA	ICUUGCU	
1185	GCAAGCC	C	UGUGCCC			GGGCACA	CUGAUGAG	X	CGAA	IGCUUGC	
1186	CAAGCCC	U	GUGCCCG			CGGGCAC	CUGAUGAG	X	CGAA	IGGCUUG	
1191	CCUGUGC	C	CGAGUGU			ACACUCG	CUGAUGAG	X	CGAA	ICACAGG	
1192	CUGUGCC	C	GAGUGUG			CACACUC	CUGAUGAG	X	CGAA	IGCACAG	
1201	AGUGUGC	U	AUGGUCU			AGACCAU	CUGAUGAG	X	CGAA	ICACACU	
1208	UAUUGUC	U	GGCAUG			CAUGCCC	CUGAUGAG	X	CGAA	IACCAUA	
1213	UCUGGGC	A	UGGAGCA			UGCUGCA	CUGAUGAG	X	CGAA	ICCCAGA	
1220	AUGGAGC	A	CUUGCGA			UCGCAAG	CUGAUGAG	X	CGAA	ICUCCAU	

Table 34

1222	GGAGCAC U UGCGAGA	UCUCGCA CUGAUGAG X CGAA IUGCUCC
1239	UGAGGGC A GUUACCA	UGGUAAC CUGAUGAG X CGAA ICCUCUA
1245	CAGUAC C AGUGCCA	UGGCACU CUGAUGAG X CGAA IUAACUG
1246	AGUUAAC A GUGCCAA	UUGGCAC CUGAUGAG X CGAA IGUAACU
1251	CCAGUGC C AAUAUCC	GGUAUUA CUGAUGAG X CGAA ICACUGG
1252	CAGUGCC A AUUAUCCA	UGGAUUA CUGAUGAG X CGAA IGACUUG
1258	CAUAUAC C AGGAGUU	AAUCCU CUGAUGAG X CGAA IAUUAUG
1259	AAUAUCC A GGAUUAU	AAACUCC CUGAUGAG X CGAA IGUAUUA
1269	AGUUAUC U GGCUGCA	UGCAGCC CUGAUGAG X CGAA ICACUCC
1273	UGCUGGC U GCAAGAA	UUCUUGC CUGAUGAG X CGAA ICCAGCA
1276	UGGCUGC A AGAAGAU	AUCUUCU CUGAUGAG X CGAA ICAGCCA
1285	GAGAUAC U UUGGGAG	CUCCCAA CUGAUGAG X CGAA IAUUCUC
1294	UGGAGAC C UGGCAUU	AAUGCCA CUGAUGAG X CGAA ICUCCCA
1295	GGGAGCC U GGCATUU	AAAGUCC CUGAUGAG X CGAA IGCUCCC
1299	GCUGGCC A UUCUCGC	GCAGAAA CUGAUGAG X CGAA ICCAGGC
1304	GCAUUC U GCGGAG	CUCCGGC CUGAUGAG X CGAA IAAUUGC
1307	UUUCUGC C GGAGAGC	GCUCUCC CUGAUGAG X CGAA ICAGAAA
1315	GGAGAGC U UUGAUGG	CCAUCAA CUGAUGAG X CGAA ICUCUCC
1327	UGGGAGC C CAGCTUC	GAGGCUG CUGAUGAG X CGAA IUUCCCA
1328	GGGAGCC C AGCCUCC	GGAGGCU CUGAUGAG X CGAA IGCUCCC
1329	GGAGCCC A GCUCCA	UGGAGGC CUGAUGAG X CGAA IGGUCCC
1332	ACCCAGC C UCCACAA	UGUUGGA CUGAUGAG X CGAA ICUGGCU
1333	CCCAGCC U CCAACAC	GUGUUGG CUGAUGAG X CGAA ICGUGGG
1335	CAGCCUC C AACACUG	CAGUUAU CUGAUGAG X CGAA IAGGCUG
1336	AGCCUCC A ACACUGC	GCAGUGU CUGAUGAG X CGAA IAGGCUU
1339	CUCCAAC A CUGCCCC	GGGGCAG CUGAUGAG X CGAA IUUGGAG
1341	CCAACAC U GCCCCGC	GCGGGGC CUGAUGAG X CGAA IUGUUGG
1344	ACACUGC C CGCUCUC	GGAGCGG CUGAUGAG X CGAA ICAGUGU
1345	CACUGCC C CGCUCCA	UGGAGCG CUGAUGAG X CGAA IGAGUGU
1346	ACUGCCC C GCUCGAG	CUGGAGC CUGAUGAG X CGAA IGGCAGU
1349	GCCCCGC U CCAGCCA	UGGCUGG CUGAUGAG X CGAA ICGGGCC
1351	CCGCGUC C AGCCAGA	UCUGGCU CUGAUGAG X CGAA IAGCGGG
1352	CCGCUCC A GCCAGAG	CUCUGGC CUGAUGAG X CGAA IAGCGGG
1355	CUCCAGC C AGAGCAG	CUGCUUCU CUGAUGAG X CGAA ICUGGAG
1356	UCCAGCC A GAGCAGC	GCUGCUC CUGAUGAG X CGAA IGCUGGA
1361	CCAGAGC A GCUCCAA	UUGGAGC CUGAUGAG X CGAA ICUCUGG
1364	GAGCAGC U CCAAGUG	CACUUGG CUGAUGAG X CGAA ICUGCUC
1366	GCAGCUC C AAGUGUU	AACACUU CUGAUGAG X CGAA IAGCUGU
1367	CAGCUCC A AGUGUUU	AAACACU CUGAUGAG X CGAA IAGCUGC
1380	UUGAGAC U CUGGAAG	CUUCCAG CUGAUGAG X CGAA IUCUCAA
1382	GAGACUC U GGAAGAG	CUCUUCU CUGAUGAG X CGAA IAGUCUC
1393	AGAGAUAC A CAGGUUA	UAACCUU CUGAUGAG X CGAA IAUUCUU
1395	AGAUACAC A GGUUACC	GGUAACC CUGAUGAG X CGAA IUGUAUU
1402	AGGUUAC C UAUAUUA	AUGUAUA CUGAUGAG X CGAA IUAACCU
1403	GGUUAAC U AUACAUU	GAUGUAU CUGAUGAG X CGAA IGUUACC
1408	CCUAUAC A UCUCAGC	GCUGAGA CUGAUGAG X CGAA IUAUAGG
1411	AUAACAU U CAGCAUG	CAUGCUG CUGAUGAG X CGAA IAUUAUU

Table 34

1413	ACAUCUC A GCAUGGC	GCCAUUC CUGAUGAG X CGAA TAGAUGU
1415	UCUCAGC A UGGCCGG	CCGGCCA CUGAUGAG X CGAA ICUGAGA
1421	GCAUUGC C GGACAGC	GCUGUCC CUGAUGAG X CGAA ICCAUGC
1426	GCGGAC A GCCUGCC	GGCAGGC CUGAUGAG X CGAA IUCCGGC
1429	GGACAGC C UGCCUGA	UCAGGCA CUGAUGAG X CGAA ICUGUCC
1430	GACAGCC U GCTUGAC	GUCAGGC CUGAUGAG X CGAA TGCUGUC
1433	AGCCUGC C UGACUCC	GAGGUCA CUGAUGAG X CGAA ICAGGCU
1434	GCCUGCC U GACCUCA	UGAGGUC CUGAUGAG X CGAA TGCAGGC
1438	GCCUGAC C UGACGCU	ACGCUCA CUGAUGAG X CGAA IUACAGC
1439	CCUGACC U CAGGUC	GACGUG CUGAUGAG X CGAA TGCAGG
1441	UGACUCC A GCGUCU	AAGAGC CUGAUGAG X CGAA TACGUC
1447	CAGGUC U UCCAGAA	UUCUGGA CUGAUGAG X CGAA TACGUC
1450	CGUCUUC C AGAACCU	AGGUUC CUGAUGAG X CGAA TACGAG
1451	GUUCUCC A GAACUUG	CAGGUUC CUGAUGAG X CGAA TGAAGAC
1456	CCAGAAC C UGCAAGU	ACTUGCA CUGAUGAG X CGAA IUUCUGG
1457	CAGAAC C GCAAGUA	UACUUGC CUGAUGAG X CGAA TGUUCUG
1460	AACUCC A AGUAAUC	GAUUAU CUGAUGAG X CGAA TACGGUU
1468	AGUAAUC C GGGGAGC	CGUCCCC CUGAUGAG X CGAA TAUUAU
1481	CGAAUUC U GCACAU	AUUGUCC CUGAUGAG X CGAA TAUUUG
1484	AUUCUGC A CAUUGGC	CCCAUUG CUGAUGAG X CGAA TACAGAU
1486	UCUGCAC A AUGGGCC	GGCCAU CUGAUGAG X CGAA TUGCAGA
1494	AUGGCG C UACUGCC	GGGAGUA CUGAUGAG X CGAA TCGCCAU
1495	UGGCGCC U ACUGCCU	AGCGAGU CUGAUGAG X CGAA TCGGCCA
1498	CGCCUAC U CGCUGAC	GUCAGG CUGAUGAG X CGAA TTAGGCG
1502	UACUCC U GACCCUG	CAGGUUC CUGAUGAG X CGAA TCGAGUA
1506	CGCUGAC C CUGCAAG	CUUGCAG CUGAUGAG X CGAA TUCAGG
1507	GCUGACC C UGCAAGG	CCUUGCA CUGAUGAG X CGAA TGUACG
1508	CUGACCC U GCAAGGG	CCUUGC CUGAUGAG X CGAA TGUACG
1511	ACCCUGC A AGGCGUG	CAGCCCU CUGAUGAG X CGAA TACGGGU
1517	CAAGGGC U GGGCAUC	GAUGCCC CUGAUGAG X CGAA TCCUUG
1522	GCUGGGC A UGACGUG	CAGCUGA CUGAUGAG X CGAA TCCAGC
1525	GGGCAUC A GCUGGCU	AGCCAGC CUGAUGAG X CGAA TAUCCC
1528	CAUCAGC U GGCUGGG	CCAGCC CUGAUGAG X CGAA TCUAUG
1532	AGCUGGC U GGGGUG	CAGCCCC CUGAUGAG X CGAA TCCAGCU
1538	CUGGGC U GCGUCA	UGAGGCG CUGAUGAG X CGAA TCCCCAG
1543	GCUGGC U CACUGAG	CUCAGU CUGAUGAG X CGAA TCGAGC
1545	UGCGUCC A CUGAGGG	CCUUCAG CUGAUGAG X CGAA TAGGCA
1547	CGCUCAC U GAGGGAA	UUCUCC CUGAUGAG X CGAA TUGAGCG
1556	AGGGAAC U GGGCAGU	ACUGCCC CUGAUGAG X CGAA TUCUCCU
1561	ACUGGGC A GUGGACU	AGUCCAC CUGAUGAG X CGAA TCCAGU
1568	AGUGGAC U GGCUCUC	GAGGGCC CUGAUGAG X CGAA TUCCACU
1572	GACUGGC C CUCAUCC	GGAUGAG CUGAUGAG X CGAA TCCAGUC
1573	ACUGGCC C UCAUCCA	UGGAUGA CUGAUGAG X CGAA TGCAGU
1574	CUGGGCC U CAUCCAC	GUGGAUG CUGAUGAG X CGAA TGGCCAG
1576	GGCCUCC A UCCACCA	UGGUGGA CUGAUGAG X CGAA TAGGGCC
1579	CCUCAUC C ACCAUAA	UUAUGGU CUGAUGAG X CGAA TAUAGG
1580	CUCAUCC A CCAUAA	GUUAUGG CUGAUGAG X CGAA TGAUGAG

Table 34

1582	CAUCCAC C AUAACAC		GUGUUAU CUGAUGAG X CGAA IUGGAUG	
1583	AUCCACC A UAACACC		GGUGUUA CUGAUGAG X CGAA IGUGGAU	
1588	CCAUAAC A CCCACCU		AGGUGGG CUGAUGAG X CGAA IUUAUGG	
1590	AUAACAC C CACCUCU		AGAGGUG CUGAUGAG X CGAA IUGUUAU	
1591	UAACACC C ACCUCUG		CAGAGGU CUGAUGAG X CGAA IGUGUUA	
1592	AACACCC A CCUCUGC		GCAGAGG CUGAUGAG X CGAA IGGUGUU	
1594	CACCCAC C UCUGCUU		AAGCAGA CUGAUGAG X CGAA IUGGGUG	
1595	ACCCACC U CUGCUUC		GAAGCAG CUGAUGAG X CGAA IGUGGUU	
1597	CCACCUC U GCUUGU		ACGAAGC CUGAUGAG X CGAA IAGGUGG	
1600	CCUGUGC U UGUGCA		UGCACGA CUGAUGAG X CGAA ICAGAGG	
1607	UUCGUGC A CACGUGG		CACCGUG CUGAUGAG X CGAA ICACGAA	
1609	CGUGCAC A CGUGGCC		GGCACCG CUGAUGAG X CGAA IUGCACG	
1616	CGGUGC C CUGGGAC		GUCCAG CUGAUGAG X CGAA ICACCGU	
1617	CGUGGCC C UGGGACC		GGUCCCA CUGAUGAG X CGAA IGCACCG	
1618	GGUGCCC U GGGACCA		UGGUGCC CUGAUGAG X CGAA IGGACCC	
1624	CUGGGAC C AGCUUUU		AAGAGCU CUGAUGAG X CGAA IUCCGAG	
1625	UGGGACC A GCUUUUU		AAAGAGC CUGAUGAG X CGAA IUGCCCA	
1628	GACCAGC U CUUUCGG		CCGAAGG CUGAUGAG X CGAA IUGGUGC	
1630	CCAGCUC U UUGCGAA		UUCCGAA CUGAUGAG X CGAA IAGCUGG	
1639	UCGGAAC C CGCACCA		UGGUGCG CUGAUGAG X CGAA IUUCCGA	
1640	CGGAACC C GCACCAA		UUGGUGC CUGAUGAG X CGAA IGUUCGG	
1643	AACCCGC A CCAAGCU		AGCUUGG CUGAUGAG X CGAA ICGGUGU	
1645	CCCGCAC C AAGCUCU		AGAGCUU CUGAUGAG X CGAA IUCCGGG	
1646	CCGCACC A AGCUCUG		CAGAGCU CUGAUGAG X CGAA IUGGCGG	
1650	ACCAAGC U CUGCUCC		GGAGCAG CUGAUGAG X CGAA ICUUGGU	
1652	CAAGCUC U GCUCCAC		GUGGAGC CUGAUGAG X CGAA IAGCUUG	
1655	GCUCUGC U CCACACU		AGUGUGG CUGAUGAG X CGAA ICAGAGC	
1657	UCUGCUC C ACACUGC		GCAGUGU CUGAUGAG X CGAA IAGCAGA	
1658	CUGCUCC A CACUGCC		GGCAGUG CUGAUGAG X CGAA IAGAGAG	
1650	GCUCAC A CUGCCAA		UUGGCGG CUGAUGAG X CGAA IUGGAGC	
1662	UCCACAC U GCCAAC		GGUUGGC CUGAUGAG X CGAA IUGUGGA	
1665	ACACUGC C AACCGGC		GCCGGUU CUGAUGAG X CGAA ICAGUGU	
1666	CACUGCC A ACCGGCC		GGCCGGU CUGAUGAG X CGAA IGCAGUG	
1669	UGCCAAC C GGCCAGA		UCUGGCC CUGAUGAG X CGAA IUUGGCA	
1673	AACCGGC C AGAGGAC		GUCCUCU CUGAUGAG X CGAA ICCGGUU	
1674	ACCGGCC A GAGGACG		CGUCCUC CUGAUGAG X CGAA IGCCTGU	
1699	CGAGGGC C UGGCCUG		CAGGCCA CUGAUGAG X CGAA ICCUUGG	
1700	GAGGGCC U GGCUCGC		GCAGGCC CUGAUGAG X CGAA IGCCUUC	
1704	GCCUGGC C UGCCACC		GGUGGCA CUGAUGAG X CGAA ICCAGGC	
1705	CTUGGCC U GCCACCA		UGGUGGC CUGAUGAG X CGAA IGCCAGG	
1708	GGCCUGC C ACCAGCU		AGCUGGU CUGAUGAG X CGAA ICAGGCC	
1709	GCCUGCC A CCAGCUG		CAGCUGG CUGAUGAG X CGAA IGCAGGC	
1711	CUGCCAC C AGCUGUG		CACAGCU CUGAUGAG X CGAA IUGGCGG	
1712	UGCCACC A GCUGUGC		GCACAGC CUGAUGAG X CGAA IUGGCGA	
1715	CACCAAG U UUGCGCC		GGCCAC CUGAUGAG X CGAA IUGGUGG	
1722	UGUGCGC C CGAGGGC		GCCCUGG CUGAUGAG X CGAA IGCACCA	
1723	GUGCGEC C GAGGGCA		UGCCUUG CUGAUGAG X CGAA IGCACAC	

Table 34

1730	CGAGGGC A CUGCUUG		CCAGCAG CUGAUGAG X CGAA ICCCUUG	
1732	AGGGCAC U GCUGGG		CCCCAGC CUGAUGAG X CGAA IUGCCU	
1735	GCACUGC U GGGGUCC		GGACCCC CUGAUGAG X CGAA ICAGUGC	
1742	UGGGGUC C AGGGCCC		GGGCCCU CUGAUGAG X CGAA IACCCCA	
1743	GGGGUCC A GGGCCCA		UGGGCCC CUGAUGAG X CGAA IAGCCCC	
1748	CCAGGGC C CACCCAG		CUGGGUG CUGAUGAG X CGAA ICCCUUG	
1749	CAGGGCC C ACCCAGU		ACUGGGU CUGAUGAG X CGAA IGCCCUU	
1750	AGGGCCC A CCCAGUG		CACUGGG CUGAUGAG X CGAA IGGCCCU	
1752	GGCCACC C CAGUGUG		CACACUG CUGAUGAG X CGAA IUGGGCC	
1753	GCCACCC C AGUGUGU		ACACACU CUGAUGAG X CGAA IUGGGGC	
1754	CCACCCC A GUGUGUC		GACACAC CUGAUGAG X CGAA IGGUGGG	
1762	GUGUGUC A ACUGCAG		CUGCAGU CUGAUGAG X CGAA IACACAC	
1765	UGUACAAC U GCAGCCA		UGGCUGC CUGAUGAG X CGAA IUUGACA	
1768	CAACUGC A GCCAGUJ		AAUCGGC CUGAUGAG X CGAA ICAGUUG	
1771	CUGCAGC C AGUUCU		AGGAACU CUGAUGAG X CGAA ICUGCAG	
1772	UGCAGCC A GUUCUU		AAGGAAC CUGAUGAG X CGAA IGCUGCA	
1777	CCAGUUC C UUCGGGG		CCCCGAA CUGAUGAG X CGAA IAAUCUG	
1778	CAGUUCU U UCGGGGC		GCCCCGA CUGAUGAG X CGAA IGAACUG	
1786	UCGGGCG C AGGAGUG		CACUCCU CUGAUGAG X CGAA ICCCCCG	
1787	CGGGGCC A GGAGUGC		GCACUCC CUGAUGAG X CGAA IGGCCCG	
1807	GGAAUGC C GAGUACU		AGUACUC CUGAUGAG X CGAA ICAUJCC	
1814	CGAGUAC U GCAGGGG		CCCCUGC CUGAUGAG X CGAA IUACUCG	
1817	GUACUGC A GGGGCUC		GAGCCCC CUGAUGAG X CGAA ICAGUAC	
1823	CAAGGGC U CCCCAGG		CCUGGGG CUGAUGAG X CGAA ICCCUUG	
1825	GGGGCUC C CCAGGGA		UCCUGGG CUGAUGAG X CGAA IAGCCCC	
1826	GGGCUCC C CAGGGAG		CUCCUGG CUGAUGAG X CGAA IGAGCCC	
1827	GGCUCCC C AGGGAGU		ACUCCCU CUGAUGAG X CGAA IGGAGCC	
1828	GCUCCCC A GGGAGUA		UACUCCC CUGAUGAG X CGAA IGGGAGC	
1845	UGAAUGC C AGGCACU		AGUGCCU CUGAUGAG X CGAA ICAUUA	
1846	GAAUGCC A GGCACUG		CAGUGCC CUGAUGAG X CGAA IGCAUUC	
1850	GCCAGGC A CUGUUGU		CAACACG CUGAUGAG X CGAA ICCUGGC	
1852	CAGGCAC U GUUUGCC		GGCAAAC CUGAUGAG X CGAA IUGCCUG	
1859	UGUUGC C GUGCCAC		GUGGCAC CUGAUGAG X CGAA TCAACA	
1864	GCGGUC C ACCUGA		UCAGGGU CUGAUGAG X CGAA ICACGGC	
1865	CCGUGCC A CCUGAG		CUCAGGG CUGAUGAG X CGAA IGCAOAG	
1867	GUGCCAC C CUGAGUG		CACUCAG CUGAUGAG X CGAA IUGGCAC	
1868	UGCCACC C UGAGUGU		ACACUCA CUGAUGAG X CGAA IUGGCA	
1869	GCCACCC U GAGUGUC		GACACUC CUGAUGAG X CGAA IGGUGGC	
1877	GAGUGUC A GCGCCAG		CUGGGGC CUGAUGAG X CGAA IACACUC	
1880	UGUCAGC C CCAGAAU		AUUCUGG CUGAUGAG X CGAA ICUGACA	
1881	GUCAGCC C CAGAAUG		CAUUCUG CUGAUGAG X CGAA ICGUCAG	
1882	UCAGCCC C AGAAUGG		CCAUCU CUGAUGAG X CGAA IGGUGA	
1883	CAGCCCC A GAAUGGC		GCCAUCU CUGAUGAG X CGAA IGGGUG	
1891	GAAUGGC U CAGUGAC		GUCACUG CUGAUGAG X CGAA ICCAUUC	
1893	AUGGCU C GUACCU		AGGUCAC CUGAUGAG X CGAA IAGCCAU	
1899	CAGUGAC C UGUUUUG		CAAAACA CUGAUGAG X CGAA IUACUG	
1900	AGUGACC U GUUUUGG		CCAAAAC CUGAUGAG X CGAA IGCACU	

Table 34

1910	UUUGGAC C GGAGGCU	AGCCUCC CUGAUGAG X CGAA IUCCAAA
1917	CGGAGGC U GACCAGU	ACUGGUC CUGAUGAG X CGAA ICCUCCG
1921	GGCUGAC C AGUGUGU	ACACACU CUGAUGAG X CGAA IUCAGCC
1922	GCUGACC A GUGUGUG	CACACAC CUGAUGAG X CGAA IGUCAGC
1932	GUGUGGC C UGUGCCC	GGGCACA CUGAUGAG X CGAA ICCACAC
1933	UGUGGCC U GUGCCCA	UGGGCAC CUGAUGAG X CGAA IGCCACA
1938	CCUGUGC C CACUAAU	UAUAGUG CUGAUGAG X CGAA ICAAGG
1939	CUGUGCC C ACUAAUA	UUUAUGU CUGAUGAG X CGAA IGCACAG
1940	UGUGCCC A CUAAAG	CUUAUAG CUGAUGAG X CGAA IGGCACA
1942	UGCCCAC U AUAAGGA	UCCUUAU CUGAUGAG X CGAA IUGGGCA
1951	UAAGGAC C CUCCCUU	AAGGGAG CUGAUGAG X CGAA IUCCUUA
1952	AAGGACC C UCCCUUC	GAAGGGA CUGAUGAG X CGAA IGUCUUU
1953	AGGACCC U CCUCUUC	AGAAGGG CUGAUGAG X CGAA IGGUCCU
1955	GACCCUC C CUUCUGC	GCAGAG CUGAUGAG X CGAA IAGGUGC
1956	ACCCUCC C UUCUGCG	CGCAGAA CUGAUGAG X CGAA IAGGGGU
1957	CCCUCCC U UCUGCGU	ACGCAGA CUGAUGAG X CGAA IGGAGGG
1960	UCCCUUC U GCGUGGC	GCCAGCC CUGAUGAG X CGAA IAAAGGA
1968	GCGUGGC C CGCUGCC	GGCAGCG CUGAUGAG X CGAA IGCACGC
1969	CGUGGCC C GCUGCCC	GGGCAGC CUGAUGAG X CGAA IGCCACG
1972	GGCCGCG U GCCCCAG	CUGGGGC CUGAUGAG X CGAA ICGGGCC
1975	CCGUGGC C CCAGCGG	CCGUGGG CUGAUGAG X CGAA ICAGCGG
1976	CGCUGCC C CAGCGGU	ACCGCUG CUGAUGAG X CGAA IGCAGCG
1977	CGUGGCC C AGCGGUG	CACCGCU CUGAUGAG X CGAA IGGCAGC
1978	UGCCCCC A GCGGUGU	ACACCGC CUGAUGAG X CGAA IGGGCG
1991	GUGAAAC C UGACCUU	GAGGUCA CUGAUGAG X CGAA IUUUCAC
1992	UGAAACC U GACCUCU	AGAGGUC CUGAUGAG X CGAA IGUUUCA
1996	ACCUGAC C UCUCUUA	UAGGAGA CUGAUGAG X CGAA IUACAGU
1997	CCUGACC U CUCCUAC	GUAGGAG CUGAUGAG X CGAA IGUCAGG
1999	UGACCUU U CCUACAU	AUGUAGG CUGAUGAG X CGAA IAGGUCA
2001	ACCUUUC C UACAUUC	GCAUGUA CUGAUGAG X CGAA IAGAGGU
2002	CCUCUCC U ACAUGCC	GGCAUGU CUGAUGAG X CGAA IGAGAGG
2005	CUCCUAC A UGCCCAU	AUGGGCA CUGAUGAG X CGAA IUAGGAG
2009	UAUAGCC C CAUCUGG	CCAGUAG CUGAUGAG X CGAA ICAUUGA
2010	ACAUGCC C AUCUGGA	UCCAGAU CUGAUGAG X CGAA IGCAUGU
2011	CAUGCCC A UCUGGAA	UUCUAGA CUGAUGAG X CGAA IGGCAUG
2014	GCCCAUC U GGAAGUU	AACUUCU CUGAUGAG X CGAA IAGGGGC
2024	AAGUUUC C AGAUGAG	CUCAUCU CUGAUGAG X CGAA IAAACUU
2025	AGUJUCC A GAUGAGG	CCUCAUC CUGAUGAG X CGAA IGAACAU
2040	AGGGGCG A UGCCAGC	GCUGGCA CUGAUGAG X CGAA ICGCCCU
2044	CGCAUGC C AGCCUUG	CAAGGCU CUGAUGAG X CGAA ICAUGCG
2045	GCAUGCC A GCUUUGC	GCAAGGC CUGAUGAG X CGAA IGCAGUC
2048	UGCCAGC C UUGCCCC	GGGGCAA CUGAUGAG X CGAA ICGGGCA
2049	GCCAGCC U UGCCCCA	UGGGGCA CUGAUGAG X CGAA ICGUGGC
2053	GCUUUGC C CCAUCAA	UUGAUGG CUGAUGAG X CGAA ICAAGGC
2054	CCUUGCC C CAUCAAC	GUUGAUG CUGAUGAG X CGAA IGCAGG
2055	CUUGCCC C AUCAACU	AGUUGAU CUGAUGAG X CGAA IGGCAAG
2056	UUGCCCC A UCAACUG	CAGUUGA CUGAUGAG X CGAA IGGGCAA

Table 34

2059	CCCCAUC A ACUGCAC		GUGCAGU CUGAUGAG X CGAA IAU0GGG	
2062	CAUCAAC U GCACCCA		UGGUGUC CUGAUGAG X CGAA IUUGAUG	
2065	CAACUGC A CCCACUC		GAGUGGG CUGAUGAG X CGAA ICAGUUG	
2067	ACUGCAC C CACUCU		AGGAGUG CUGAUGAG X CGAA IUUGAGU	
2068	CUGCACC C ACUCUUG		CAGGAGU CUGAUGAG X CGAA IAGUGCAG	
2069	UGCACC C CUUCUGU		ACAGGAG CUGAUGAG X CGAA IGGUGCA	
2071	CACCCAC U CCUGUGU		ACACAGG CUGAUGAG X CGAA IUUGGUG	
2073	CCACUC C UGUGUGG		CCACAGA CUGAUGAG X CGAA IAGUGGG	
2074	CCACUC U GUGUGGA		UCCACAC CUGAUGAG X CGAA IGAGUGG	
2083	UGUGGAC C UGGAUGA		UUAUCCA CUGAUGAG X CGAA IUCCACA	
2084	GUGGACC U GGAUGAC		GUCAUCC CUGAUGAG X CGAA IUCCAC	
2092	GGAGGAC A AGGUGUG		CAGCCCU CUGAUGAG X CGAA IUCAUCC	
2098	CAAGGGC U GCGCCGC		GCGGGGC CUGAUGAG X CGAA ICCUUG	
2101	GGGUGC C CGCGGA		UCGGGG CUGAUGAG X CGAA ICAAGCC	
2102	GGUGCC C CGCGAG		CUCGGG CUGAUGAG X CGAA ICGAGCC	
2103	CGUGCC C GCGAGC		GCGGG CUGAUGAG X CGAA IGGCAG	
2106	GCGCCG C GAGCAGA		UCUGG CUGAUGAG X CGAA ICGGGC	
2111	GCGAGC A GAGAGCC		GGCUC CUGAUGAG X CGAA ICUCGG	
2118	AGAGAG C AGCCUC		GAGGG CUGAUGAG X CGAA ICUCUC	
2119	GAGAGCC A GCGUCU		AGAGGG CUGAUGAG X CGAA IGCUCUC	
2122	AGCGAG C CUCUGAC		GUCAGAG CUGAUGAG X CGAA ICUGGUC	
2123	GCGAGCC C UCUGAGC		CUGCAGA CUGAUGAG X CGAA ICGUGCC	
2124	CCAAGCC U CUGAGCU		ACGUCAG CUGAUGAG X CGAA IGGUGG	
2126	AGCCUC U GAGGUC		GGAGUC CUGAUGAG X CGAA IAGGGUC	
2133	UGAGGUC C AUCAUCU		AGAUGAU CUGAUGAG X CGAA IACGUA	
2134	GAGGUC A UCAUCUC		GAGAUGA CUGAUGAG X CGAA IGAGGUC	
2137	GUCCAC A UCUCUGC		GCAGAGA CUGAUGAG X CGAA IAUGGAC	
2140	CAUCAUC U CUGCGGU		ACCGCAG CUGAUGAG X CGAA IAUAGG	
2142	UCAUCUC U GCGGUG		CCACCG CUGAUGAG X CGAA IAGAUGA	
2155	GGUGGC A UUCUGUC		AGCAGAA CUGAUGAG X CGAA ICCAAC	
2159	GGCAUUC U GUGGUC		GACGAG CUGAUGAG X CGAA IAUGCC	
2162	AUCUGC U GUGGUG		CACGAG CUGAUGAG X CGAA ICAAGAU	
2173	CGUGUC U UGGGUG		ACCCCA CUGAUGAG X CGAA IACCAAG	
2185	GGUGUC U UUGGGAU		AUCCCA CUGAUGAG X CGAA IACCAAC	
2194	UGGGAUC C UCAUCAA		UUGGAUGA CUGAUGAG X CGAA IAUCCCA	
2195	GGGAUC U CAUCAAG		CUUGAUG CUGAUGAG X CGAA IGAUCC	
2197	GAUCCUC A UCAAGCG		CGUGAUG CUGAUGAG X CGAA IAGGAUC	
2200	CCUCAUC A AGCGAGC		CGUGUC CUGAUGAG X CGAA IAUAGG	
2210	CGACGGC A GCAGAG		CUUCGC CUGAUGAG X CGAA ICGUGG	
2213	CGGAGC A GAGAUUC		GAUCUUC CUGAUGAG X CGAA ICUGCG	
2221	GAGAUUC C GGAAGUA		UAUCUUC CUGAUGAG X CGAA IAUUCUC	
2230	GAGUAC A CGAUGCG		CGCAUC CUGAUGAG X CGAA IUACUUC	
2243	CGGAGC U CGUGCAG		CUGCAGC CUGAUGAG X CGAA IUUCUG	
2246	AGAGGUC U GCAGGAA		IUCCUGC CUGAUGAG X CGAA ICAGUCU	
2249	CUGGUC A GGAAACG		CGUUC CUGAUGAG X CGAA ICAGCAG	
2261	ACGAGC U GUGGAG		CUCCAC CUGAUGAG X CGAA ICUCUGU	
2270	GUGGAGC C CGUGACA		UGUGAGC CUGAUGAG X CGAA ICUCAC	

Table 34

2273	GAGCCGC U GACACCU	AGGUGUC CUGAUGAG X CGAA ICQGCUC
2277	CGCUGAG A CCUAGCG	CGCUAGG CUGAUGAG X CGAA IUCAGCG
2279	CUGACAC C UAGCGGA	UCCGCUA CUGAUGAG X CGAA IUGUACG
2280	UGACACC U AGCGGAG	CUCGCGU CUGAUGAG X CGAA IUGUGCA
2294	GCGAUGC C CAACCAAG	CUGGUGU CUGAUGAG X CGAA ICAUCGC
2295	CGAUGCC C AACAGG	CCUGGUU CUGAUGAG X CGAA IGCAUCG
2296	GAUGCCC A ACCAGGC	GCCUGGU CUGAUGAG X CGAA IGGCAUC
2299	GCCCAAC C AGGCGCA	UGCGCCU CUGAUGAG X CGAA IUUGGGC
2300	CCCAACC A GCGCGAG	CUGCGCC CUGAUGAG X CGAA IGUUGGG
2306	CAGGCGC A GAUGCGG	CCGCAUC CUGAUGAG X CGAA ICGCUGG
2317	GCGGAUC C UGAAAGA	UCUUUCA CUGAUGAG X CGAA IAUCCGC
2318	CGGAUCC U GAAAGAG	CUCUUCU CUGAUGAG X CGAA IGAUCCG
2333	ACGGAGC U GAGGAAG	CUUCCUC CUGAUGAG X CGAA ICUCUGU
2351	AAGGUGC U UGGAUCU	AGAUGCA CUGAUGAG X CGAA ICACCUU
2358	UUGGAUC U GCGGCUU	AAGCGCC CUGAUGAG X CGAA IAUCCAA
2364	CUGGCGC U UUGGCA	UGCCAAA CUGAUGAG X CGAA ICGCCAG
2371	UUUUGGC A CAGUCUA	UAGACUG CUGAUGAG X CGAA ICCAAA
2373	UUUGGAC A GUCUACA	UGUAGAC CUGAUGAG X CGAA IUGCCAA
2377	CACAGUC U ACAAGGG	CCCUUGU CUGAUGAG X CGAA IACUGUG
2380	AGUCUAC A AGGCAU	AUGCCCU CUGAUGAG X CGAA IUAGACU
2386	CAAGGGC A UCUGGAU	AUCCAGA CUGAUGAG X CGAA ICCCUUG
2389	GCGCAUC U GGAUCC	GGGAUCC CUGAUGAG X CGAA IAUGCC
2395	CUGGAUC C CUGAUGG	CCAUCAG CUGAUGAG X CGAA IAUCCAG
2396	UGGAUCC C UGAUGGG	CCCAUCA CUGAUGAG X CGAA IGAUCCA
2397	GGAUCCC U GAUGGGG	CCCCAUC CUGAUGAG X CGAA IGGAUCC
2420	AAAUUUC C AGUGGCC	GGCCACU CUGAUGAG X CGAA IAAUUUU
2421	AAAUUCC A GUGGCCA	UGGCCAC CUGAUGAG X CGAA IGAUUU
2427	CAGUGGC C AUCAAAG	CUUUGAU CUGAUGAG X CGAA ICCACUG
2428	AGUGGCC A UCAAAU	ACUUUGA CUGAUGAG X CGAA IGCCACU
2431	GGCCAU C AAGUGUU	AACACUU CUGAUGAG X CGAA IAUGCC
2449	GGAAAC A CAUCCCC	GGGGAUG CUGAUGAG X CGAA IUUUUCC
2451	AAACAC A UCCCCCA	UGGGGGA CUGAUGAG X CGAA IUUUUUU
2454	ACACAU C CCAAAG	CUUUGG CUGAUGAG X CGAA IAUUGU
2455	CACAUCC C CCAAAGC	GCUUUG CUGAUGAG X CGAA IGAUGUG
2456	CAUCCCC C CAAGGCC	GGCUUUG CUGAUGAG X CGAA IGAUUGU
2457	CAUCCCC C AAAGCCA	UGGCUUU CUGAUGAG X CGAA IGGGAUG
2458	AUCCCCC A AAGCCAA	UUGGCUU CUGAUGAG X CGAA IGGGAU
2463	CCAAAGC C AACAAAG	CUUUGU CUGAUGAG X CGAA ICUUUGG
2464	CAAGGCC A ACAAGA	UCUUUGU CUGAUGAG X CGAA ICGUUG
2467	AGCCAAC A AAGAAU	AUUUCUU CUGAUGAG X CGAA IUUGGCU
2476	AGAAUUC U UAGACGA	UCGUCUA CUGAUGAG X CGAA IAUUUUU
2487	ACGAAGC A UACUGA	UCACGUA CUGAUGAG X CGAA ICGUUG
2499	UGAUGGC U GGUUGGG	CCACACC CUGAUGAG X CGAA ICCAUCA
2509	UGUGGGC U CCCCACU	UAUGGGG CUGAUGAG X CGAA ICCACCA
2511	UGGGGCU C CCAUUG	CAUAUGG CUGAUGAG X CGAA IAGGCCA
2512	GGGCUCC C CAUAUGU	ACAUAUG CUGAUGAG X CGAA IAGGCC
2513	GGCUCCC C AUAUGUC	GACAUAU CUGAUGAG X CGAA IGAAGCC

Table 34

2514	GCUCCCC A UAUGUCU	AGACUA CUGAUGAG X CGAA IGGGAGC
2521	AUAUGUC U CCGCCU	AGGCGGG CUGAUGAG X CGAA IACAUAU
2523	AUGUCUC C CGCCUUC	GAAAGCG CUGAUGAG X CGAA IAGACAU
2524	UGUCUCC C GCUUCU	AGAAGGC CUGAUGAG X CGAA IGAACAA
2527	UCCCGGC C UUCUGGG	CCGAGAA CUGAUGAG X CGAA ICGGGAG
2528	UCCCGCC U UCUGGGC	GCCAGAA CUGAUGAG X CGAA ICGGGGA
2531	CGCCUUC U GGGCAUC	GAUGCCC CUGAUGAG X CGAA IAGGGCG
2536	UCUGGGC A UCUGCCU	AGGACAA CUGAUGAG X CGAA ICCGAGA
2539	GGGCAUC U GCCUGAC	GUCAGGC CUGAUGAG X CGAA IAUCCCC
2542	CAUCUGC C UGACAU	GAUGUCA CUGAUGAG X CGAA ICAGAUG
2543	AUCUGCC U GACAUCC	GGAUUC CUGAUGAG X CGAA IGCAGAU
2547	GCUGAC A UCCACGG	CCGUGGA CUGAUGAG X CGAA IUCAGGC
2550	UGACAU C ACGGUGC	GCACCGU CUGAUGAG X CGAA IAUUGCA
2551	GACAUCC A CGGUGCA	UGCACCG CUGAUGAG X CGAA IGAUGUC
2558	ACGGGAC A GCGUGG	CACGAGC CUGAUGAG X CGAA ICACCGU
2561	GUGCAGC U GGUGACA	UGUCACC CUGAUGAG X CGAA ICUGCAC
2568	UGUGUAC A CAGCUA	UAAGCUG CUGAUGAG X CGAA IUCACCA
2570	GUGACAC A GCUUAUG	CAUAAGC CUGAUGAG X CGAA IUGUCAC
2573	ACACAGC U UAUGCCC	GGGCAUA CUGAUGAG X CGAA ICUGUGU
2579	CUUAUGC C CUAUGGC	GCCAUAG CUGAUGAG X CGAA ICAUAUG
2580	UAUUGCC C UAUGGCU	AGCCAUA CUGAUGAG X CGAA IGCAGAA
2581	UAUGCCC U AUGGCU	CAGCAU CUGAUGAG X CGAA IGGCAUA
2587	CUAUGGC U GCCUCU	AAGAGGC CUGAUGAG X CGAA ICCAUAG
2590	UGGCGUC C UCUTAGA	UCUAAGA CUGAUGAG X CGAA ICAGCCA
2591	GGCUGCC U CUUAGAC	GUCUAG CUGAUGAG X CGAA IGCAGCC
2593	CUGCCUC U UAGACCA	UGGUCUA CUGAUGAG X CGAA IAGGCAG
2599	CUUAGAC C AUGUCCG	CGGACAU CUGAUGAG X CGAA IUCUAGG
2600	UAAGACC A UGUCGG	CGGACA CUGAUGAG X CGAA IGCUGAA
2605	CCAUGUC C GGGAAA	UUUCCC CUGAUGAG X CGAA IACAUUG
2614	GGAAAC C GCGGAGC	CGUCCGC CUGAUGAG X CGAA IUUUUCC
2623	CGGACGC C UGGGCU	GAGCCCA CUGAUGAG X CGAA ICGUCCG
2624	GGACGCC U GGGCUC	GGAGCCC CUGAUGAG X CGAA IGGUCC
2629	CCUGGGC U CCCAGGA	UCCUGGG CUGAUGAG X CGAA ICCAGG
2631	UGGGUC C CAGGACC	GUUCCUG CUGAUGAG X CGAA IUCCUGG
2632	GGGCUCC C AGGACCU	AGGUCCU CUGAUGAG X CGAA IAGGCC
2633	GGCUC C A GGACUG	CAGGUCC CUGAUGAG X CGAA IGGAGCC
2638	CCAGGAC C UGUGAA	UUCAGCA CUGAUGAG X CGAA IUCCUGG
2639	CAGGACC U GCUGAAC	GUUCAGC CUGAUGAG X CGAA IUGUCCG
2642	GACCUCC U GAACUGG	CCAGUUC CUGAUGAG X CGAA ICAGGUC
2647	GCGUAAC U GGUGUAU	AUACACC CUGAUGAG X CGAA IUUCAGC
2657	UGUAUGC A GAUUGCC	GGCAUUC CUGAUGAG X CGAA ICAUACA
2664	AGAUUGC C AAGGGGA	UCCCUU CUGAUGAG X CGAA ICAUUCU
2665	GAUUGCC A AGGGGAU	AUCCCCU CUGAUGAG X CGAA IGCAGUC
2677	GAUGAGC U ACCUGGA	UCCAGGU CUGAUGAG X CGAA ICUCAGC
2680	GAGCUAC C UGGAGGA	UCCUCA CUGAUGAG X CGAA IUAUCUC
2681	AGCUACC U GAGGGAU	AUCCUCC CUGAUGAG X CGAA IGAUGCU
2696	GUGCGGC U CGUACAC	GUGUACG CUGAUGAG X CGAA ICCGCAC

Table 34

2702	CUCGUAC A CAGGGAC		GUCCUCX CUGAUGAG X CGAA IUACGAG	
2704	CGUACAC A GGGACUU		AAGUCCC CUGAUGAG X CGAA IUGUAGG	
2710	CAGGGAC U UGGCCGC		GCGGCCA CUGAUGAG X CGAA IUCCUGG	
2715	ACUUGGC C GCUCGGA		UCCGAGC CUGAUGAG X CGAA ICCAAGU	
2718	UGGCCGC U CGGAACG		CGUCCG CUGAUGAG X CGAA ICGGCCA	
2729	AACGUGC U GGUCAAG		CUUGACC CUGAUGAG X CGAA ICACGUU	
2734	GCUGGUC A AGAGUCC		GGACUCU CUGAUGAG X CGAA IACCAGC	
2741	AGAGAGC C CAACCAU		AUGGUG CUGAUGAG X CGAA IACUCUU	
2742	AGAGUCC C AACCAUG		CAUGGUU CUGAUGAG X CGAA IGACUCU	
2743	GAGUCCC A ACCAUGU		ACAUGGU CUGAUGAG X CGAA IGGACUC	
2746	UCCCAAC C AUGUCA		UUGACAU CUGAUGAG X CGAA IUUGGGA	
2747	CCCAACC A UGUCAA		UUUGACA CUGAUGAG X CGAA IGUUGG	
2752	CAUGGUC A AAUUAAC		GUAAUUU CUGAUGAG X CGAA IACAUGG	
2760	AAUUAAC A GACUUCG		CGAAGUC CUGAUGAG X CGAA IUAAUUU	
2764	UACAGAC U UCGGCU		AGCCCGA CUGAUGAG X CGAA IUUGUA	
2771	UUCGGGC U GGUUGG		CCGAGCC CUGAUGAG X CGAA ICCCGAA	
2775	GCGUGC U CGGUGC		GCAGCCG CUGAUGAG X CGAA ICCAGCC	
2780	GCUCGUC U GCUAGAC		GUCCAGC CUGAUGAG X CGAA ICCGAGC	
2783	CGGUGC U GGACAUU		AAUGUCC CUGAUGAG X CGAA ICAGCCG	
2788	GCUGGAC A UUGACGA		UCGUCAA CUGAUGAG X CGAA IUCCAGC	
2799	ACGAGAC A GAGUACC		GGUACUC CUGAUGAG X CGAA IUUCUGU	
2806	AGAGUAC C AUGCAGA		UCUGCAU CUGAUGAG X CGAA IUACUCU	
2807	GAGUACC A UGCAGAU		AUCUGCA CUGAUGAG X CGAA IGUACUC	
2811	ACCAUGC A GAUGGGG		CCCCAUC CUGAUGAG X CGAA ICAUGGU	
2821	UGGGGGC A AGGUGCC		GGCACTU CUGAUGAG X CGAA ICCCCCA	
2828	AAGGUGC C CAUCAAG		CUUGAUG CUGAUGAG X CGAA ICACCUU	
2829	AGGUGCC C AUCAAGU		ACUUGAU CUGAUGAG X CGAA IGCACCU	
2830	GGUGCCC A UCAAGUG		CACUUGA CUGAUGAG X CGAA IGGACC	
2833	GCCCAUC A AGUGGAU		AUCCACU CUGAUGAG X CGAA IAUUGGC	
2846	AUGGCGC U GGAUGCC		GGACUCC CUGAUGAG X CGAA ICGCCAU	
2853	UGGAGUC C AUUCUCC		GGAGAAU CUGAUGAG X CGAA IACUCCA	
2854	GGAGUCC A IUUCUCC		CGGAGAA CUGAUGAG X CGAA IGACUCC	
2858	UCCAUCU U CGCGCG		CCGGCGG CUGAUGAG X CGAA IAAUGGA	
2860	CAUUCUC C GCGGCG		CGCCGCG CUGAUGAG X CGAA IAGAAUG	
2863	UCUCCGC C GCGGCU		AACCGCC CUGAUGAG X CGAA ICGGAGA	
2872	GCGGUC A CCACCA		UGGUGGG CUGAUGAG X CGAA IAAACGC	
2874	GGUCCAC C CACAGA		UCUGGUG CUGAUGAG X CGAA IUGAAC	
2875	GUUACCC C ACCAGAG		ACUCUGG CUGAUGAG X CGAA IAGUGAA	
2876	UUCACCC A CCAGAGU		UCACUCU CUGAUGAG X CGAA IUGGUGG	
2878	CACCCAC C AGAGUGA		AUCACUC CUGAUGAG X CGAA IUGUGGU	
2879	ACCCACC A GAGUGAU		CCCACAC CUGAUGAG X CGAA IUCACAC	
2907	GUGUGAC U GUGUGGG		AGUCAUC CUGAUGAG X CGAA ICUCCCA	
2918	UGGGAGC U GAUGACU		CCCCAAA CUGAUGAG X CGAA IUCAUCA	
2925	UGAUGAC U UUGGGG		AAAGUUU CUGAUGAG X CGAA ICCCCAA	
2934	UUGGGGC C AACCUU		UAAGGUU CUGAUGAG X CGAA IGGCCCA	
2935	UGGGGCC A AACCUUA		AUCGUAU CUGAUGAG X CGAA IUUUGGC	
2939	GCCAAAC C UUACGAU			

Table 34

2940	CCAAACC U UACGAUG	CAUCGUA CUGAUGAG X CGAA IGUUGG
2953	UGGGAUC C CAGCCCG	CGGCGUG CUGAUGAG X CGAA IAUCCCA
2954	GGGAUCC C AGCCCGG	CCGGGCU CUGAUGAG X CGAA IGAUCCC
2955	GGAUCCC A GCCCGGG	CCCGGGC CUGAUGAG X CGAA IGGAUCC
2958	UCCGAGC C CGGAGAA	UCUCCCG CUGAUGAG X CGAA ICUGGGA
2959	CCCAGCC C GGGAGA U	AUCUCCC CUGAUGAG X CGAA IGCUGGG
2968	GGAGAUC C CUGACCU	AGGUCAG CUGAUGAG X CGAA IAUUCC
2969	GGAUCC C UGACCUG	CAGGUGA CUGAUGAG X CGAA IGAUUCU
2970	AGAUCCC U GACCUCC	GCAGGUC CUGAUGAG X CGAA IGAUUCU
2974	CCUGAC C UGCUGGA	UCCAGCA CUGAUGAG X CGAA IUCCAGG
2975	CCUGACC U GCUUGAA	UCCAGC CUGAUGAG X CGAA IGAUGAG
2978	GACCUCC U GGAAGAG	CUUUUCC CUGAUGAG X CGAA ICAGGUC
2996	GAGGGC U GCCCCAG	CUGGGGC CUGAUGAG X CGAA ICCGUC
2999	GGGUGC C CCAGCCC	GGGUGG CUGAUGAG X CGAA ICAGCCG
3000	GGGUGC C CAGCCCC	GGGGGCU CUGAUGAG X CGAA IGCAGCC
3001	GUUCCCC C AGCCCCC	GGGGGCU CUGAUGAG X CGAA IGGCAGC
3002	CUGCCCC A GCCCCCC	GGGGGGC CUGAUGAG X CGAA IGGCAG
3005	CCCCAGC C CCCCACU	GAUGGGG CUGAUGAG X CGAA ICUGGGG
3006	CCCAGCC C CCCAUU	AGAUGGG CUGAUGAG X CGAA IGCUGGG
3007	CCAGCCC C CCAUUG	CAGAUUG CUGAUGAG X CGAA IGGCUGG
3008	CAGCCCC C CAUCUGC	GCAGAGU CUGAUGAG X CGAA IGGGUG
3009	AGCCCCC C AUUGCA	UGCAGAU CUGAUGAG X CGAA IGGGGU
3010	GCCCCC A UCUGCAC	GUGCAGA CUGAUGAG X CGAA IGGGGC
3013	CCCCAU C GCACCAU	AUGGUGC CUGAUGAG X CGAA IAUUGGG
3016	CAUCUGC A CCAUUGA	UCAUUG CUGAUGAG X CGAA ICAGAU
3018	UCUGCAC C AUUGAU	CAUCAU CUGAUGAG X CGAA IUGCAGA
3019	CUGACCC A UUGAUGU	ACAUCAA CUGAUGAG X CGAA IGUGCAG
3028	UGAUGUC U ACAUGAU	AUCAUGU CUGAUGAG X CGAA IACAUCA
3031	UGUCUAC A UGAUCAU	AUGAUCA CUGAUGAG X CGAA IUAGACA
3037	CAUGAUC A UGGUCAA	IUGACCA CUGAUGAG X CGAA IAUCAUG
3043	CAUGGUC A AAUGUUG	CAACAU CUGAUGAG X CGAA IACCAUG
3061	GAUUGAC U CUGAAUG	CAUUCAG CUGAUGAG X CGAA IUCAUUC
3063	UGACUC U GAUUGUC	GACAUUC CUGAUGAG X CGAA IAGUCAA
3074	UGUGGCG C AAGAUUC	GAUUCU CUGAUGAG X CGAA ICCGACA
3075	GUCGGCC A AGAUUCC	GAUUCU CUGAUGAG X CGAA IGGCGAC
3082	AAGAUUC C GGGAGUU	AACUCCC CUGAUGAG X CGAA IAAUCUU
3096	UGGUGUC U GAUUCU	AGAAUUC CUGAUGAG X CGAA IACACCA
3103	UGAAUUC U CCGCAU	AUGCGGG CUGAUGAG X CGAA IAAUJCA
3105	AAUUCUC C CGCAUGG	CCAUGG CUGAUGAG X CGAA IAGAAU
3106	AUUCUCC C GCAUGGC	GCCAUGC CUGAUGAG X CGAA IGAGAU
3109	CUCCGCG A UGGCCAG	CUGGCCA CUGAUGAG X CGAA ICGGGAG
3114	GCAUGGC C AGGAGCC	GGUCCU CUGAUGAG X CGAA ICCAUGC
3115	CAUGGCC A GGGACCC	GGGUCCC CUGAUGAG X CGAA IGCCAU
3121	CAGGAGC C CCGACG	CGCUGG CUGAUGAG X CGAA IUCCUG
3122	AGGGACC C CAGCGC	GGCUGG CUGAUGAG X CGAA IGUCCU
3123	GGGACCC C CAGCGCU	AGCGUG CUGAUGAG X CGAA IGGUCC
3124	GGACCCC C AGCGCU	AAGCGU CUGAUGAG X CGAA IGGUCC

Table 34

3125	GACCCOC A GCGCUU		AAAGCGC CUGAUGAG X CGAA IGGGGUC	
3130	CCAGCGC U UUGUGGU		ACCACAA CUGAUGAG X CGAA ICGUGG	
3139	UGUGGUC A UCCAGAA		UUCUGGA CUGAUGAG X CGAA IACCACA	
3142	GGUCAUC C AGAAUGA		UCAUUCU CUGAUGAG X CGAA IAUAGCC	
3143	GUCAUCC A GAAUGAG		CUCAUUC CUGAUGAG X CGAA IGAUGAC	
3154	UGAGGAC U UGGGCC		GGGCCCA CUGAUGAG X CGAA IUCCUCA	
3160	CUUGGGC C CAGCCAG		CUGGGC CUGAUGAG X CGAA ICCCAAG	
3161	UUGGGCC C AGCCAGU		ACUGGCU CUGAUGAG X CGAA IGGCCAA	
3162	UGGGCCC A GCCAGUC		GACUGGC CUGAUGAG X CGAA IGGCCCA	
3165	GCCAGCC C AGUCCU		AGGGACU CUGAUGAG X CGAA ICUGGGC	
3166	CCAGCCG A GUCCCU		AAGGGAC CUGAUGAG X CGAA ICGUGG	
3170	GCCAGJC C CUUGGAC		GUCCAG CUGAUGAG X CGAA IACUGGC	
3171	CCAGUCC C UUGGACA		UGUCCAA CUGAUGAG X CGAA IGACUGG	
3172	CAGUCCU U UGGACAG		CUGUCCA CUGAUGAG X CGAA IGGACUG	
3178	CUGGAC A GCACCU		AAGGUGC CUGAUGAG X CGAA IUCCAG	
3181	GGACAGC A CCUCUA		UAGAAAG CUGAUGAG X CGAA ICUGUCC	
3183	ACAGCAC C UUCUACC		GGUAGAA CUGAUGAG X CGAA IUGUGU	
3184	CAGCACC U UCUCACG		CGUAGA CUGAUGAG X CGAA IUGUGU	
3187	CACCUUC U ACCGUC		GACCGU CUGAUGAG X CGAA IAGGUG	
3190	CUUCUAC C GCUCACU		AGUGAGC CUGAUGAG X CGAA IUAGAG	
3193	CUACCGC U CACUGCU		AGCAGUG CUGAUGAG X CGAA ICGUGU	
3195	ACCGUUC A CUGUGG		CCAGCAG CUGAUGAG X CGAA IAGCGU	
3197	CGCUCAC U GCUGGAG		CUCCAGC CUGAUGAG X CGAA IUGAGG	
3200	UCACUGC U GGGAGAC		GUCCUCC CUGAUGAG X CGAA IACUGA	
3214	CGAUGAC A UGGGGGA		UCCCCCA CUGAUGAG X CGAA IUACUG	
3223	GGGGAC C UGUUGA		UCCACCA CUGAUGAG X CGAA IUCCCC	
3224	GGGGACC U GGUUGAU		AUCCACC CUGAUGAG X CGAA IGUCCC	
3234	UGGAUGC U GAGGAGU		ACUCCUC CUGAUGAG X CGAA ICAUCCA	
3245	GAGUAUC U GGUACCC		GGGUACC CUGAUGAG X CGAA IAUACUC	
3251	CUGGUAC C CCAGCAG		CUGGUGG CUGAUGAG X CGAA IUACAG	
3252	UGGUACC C CAGCAGG		CUUGCUG CUGAUGAG X CGAA IUAACCA	
3253	GGUACCC C AGCAGGG		CCUGCUU CUGAUGAG X CGAA IGGUACC	
3254	GUACCCC A GCAGGGC		GCCUUC CUGAUGAG X CGAA IGGUAC	
3257	CCCCAGC A GGGCUUC		GAAGCCC CUGAUGAG X CGAA ICUGGG	
3262	GCAAGGC U UCUCUUC		CAGAAGA CUGAUGAG X CGAA ICCCUC	
3265	GGGCUUC U UCUGUCC		GGACAGA CUGAUGAG X CGAA IAGCCC	
3268	CUUCUUC U GUCCAGA		UCUGGAC CUGAUGAG X CGAA IAGAAG	
3272	UUCUGUC C AGACCCU		AGGGUUC CUGAUGAG X CGAA IACAGAA	
3273	UCUGUCC A GACCCUG		CAGGGUC CUGAUGAG X CGAA IGACAG	
3277	UCCAGAC C CUGCCCC		GGGGCAG CUGAUGAG X CGAA IUUCGGA	
3278	CCAGACC C UGCCCCC		CGGGGCA CUGAUGAG X CGAA IUGUGG	
3279	CAGACCC U GCCCCGG		CGGGGCC CUGAUGAG X CGAA IGGUGG	
3282	ACCCUCC C CGGGGCC		CGCCCCG CUGAUGAG X CGAA ICAAGGU	
3283	CCUUGCC C CGGGGCC		GCGCCCC CUGAUGAG X CGAA IGCAGG	
3284	CCUGCCC C GGGCGCU		AGCGCCC CUGAUGAG X CGAA IGGCAGG	
3291	CGGGGCG U GGGGGCA		UGCCCCC CUGAUGAG X CGAA ICGCCC	
3298	UGGGGGC A UGUUCCA		UGGACCA CUGAUGAG X CGAA ICCCCCA	

Table 54

3304	CAUGGUC C ACCACAG		CUGUGGU CUGAUGAG X CGAA IACCAUG	
3305	AUGGUCC A CCACAGG		CCUGUGG CUGAUGAG X CGAA IGACCAU	
3307	GGUCCAC C ACAGGCA		UGCCUGU CUGAUGAG X CGAA IUGGACC	
3308	GUCCACC A CAGGCAC		GUGCCUG CUGAUGAG X CGAA IGUGGAC	
3310	CCACCAC A GGCACCG		CGUGGCC CUGAUGAG X CGAA IUGGUGG	
3314	CACAGGC A CCGCAGC		GCUGCGG CUGAUGAG X CGAA ICCUGUG	
3316	CAGGCAC C GCAGCUC		GAOCUGC CUGAUGAG X CGAA IUGCCUG	
3319	GCACCGC A GCUCAUC		GAUGAGC CUGAUGAG X CGAA ICGGUGC	
3322	CCGCAGC U CAUCUAC		GUAGAUG CUGAUGAG X CGAA ICUGCGG	
3324	GCAGCUC A UCUACCA		UGGUAGA CUGAUGAG X CGAA IAGCGC	
3327	GCUCAUC U ACCAGGA		UCCUGGU CUGAUGAG X CGAA IAUGAGC	
3330	CAUCUAC C AGGAGUG		CACUCU CUGAUGAG X CGAA IUAGAGU	
3331	AUCUACC A GGAUGUG		CCACUCC CUGAUGAG X CGAA IGUAGAU	
3349	UGGGGAC C UGACACU		AGUGUCA CUGAUGAG X CGAA IUCCCCA	
3350	GGGGACC U GACACUA		UAGUGUC CUGAUGAG X CGAA IGUCCCC	
3354	ACCUGAC A CUAGGGC		GCCUAG CUGAUGAG X CGAA IUACAGU	
3356	CUGACAC U AGGGCUG		CAGCCCU CUGAUGAG X CGAA IUGUCAG	
3362	CUAGGGC U GGAGGCC		GGGCUCC CUGAUGAG X CGAA ICCCUAG	
3368	CUGGAGC C CUCUGAA		UUCAGAG CUGAUGAG X CGAA ICUCCAG	
3369	UGGAGCC C UCUGAAG		CUUCAGA CUGAUGAG X CGAA IGCUCA	
3370	GGAGCCC U CUGAAGA		UCUUCAG CUGAUGAG X CGAA IGGCUC	
3372	AGCCUUC U GAAGAGG		CCUCUUC CUGAUGAG X CGAA IAGGCU	
3384	AGGAGGC C CCCAGU		ACCUGGG CUGAUGAG X CGAA ICCUUCU	
3385	GGAGGCC C CCAGGUC		GACCUUG CUGAUGAG X CGAA IGGCUC	
3386	GAGGCC C CAGGUCU		AGACCUG CUGAUGAG X CGAA IGGCUC	
3387	AGGCCCC C AGGUCUC		GAGACCU CUGAUGAG X CGAA IGGCUC	
3388	GGCCCCC A GGUCCUC		GGAGACC CUGAUGAG X CGAA IGGGCC	
3393	CCAGGUC U CCACUGG		CCAGUGG CUGAUGAG X CGAA IACCUGG	
3395	AGGUUC C ACUGGCA		UGCCAGU CUGAUGAG X CGAA IAGACCU	
3396	GGUUCUC A CUGGCAC		GUGCCAG CUGAUGAG X CGAA IGAGACC	
3398	UCUCCAC U GGCACCC		GGGUGCC CUGAUGAG X CGAA IUUGAGA	
3402	CACUGGC A CCUCCCG		CGGAGGG CUGAUGAG X CGAA ICCAGUG	
3404	CUGGCAC C UCUGGAA		UUCGGAG CUGAUGAG X CGAA IUUGGAG	
3405	UGGCACC C UCGAAG		CUUCGGA CUGAUGAG X CGAA IGUGCCA	
3406	GGCACCC U CGAAGG		CCUUCGG CUGAUGAG X CGAA IGGUGCC	
3408	CACCCUC C GAAAGGG		CCCUUC CUGAUGAG X CGAA IAGGGUG	
3417	AAGGGGC U GGCUCGG		CGGAGCC CUGAUGAG X CGAA ICCCCUU	
3421	GGCUGGC U CGAAGU		ACAUCGG CUGAUGAG X CGAA ICCAGCC	
3423	CUGGCUC C GAUGUAU		AUACAUC CUGAUGAG X CGAA IAGCCAG	
3442	UGGUGAC C UGGGAU		AUUCCCA CUGAUGAG X CGAA IUACCA	
3443	GGUGACC U GGGAAUG		CAUUCCC CUGAUGAG X CGAA IGUCACC	
3456	UGGGGGC A GCAAGG		CCUUGGC CUGAUGAG X CGAA ICCCCCA	
3459	GGGCAGC C AAGGGGC		GCCCCUU CUGAUGAG X CGAA ICUGCCC	
3460	GGCAGCC A AGGGGCU		AGCCCCU CUGAUGAG X CGAA IGCUGCC	
3467	AAGGGGC U GCAAAGC		GCUUGGC CUGAUGAG X CGAA ICCCCUU	
3470	GGGUGC A AAGCCUC		GAGGCU CUGAUGAG X CGAA ICAGCCC	
3475	GCAAAGC C UCCCCAC		GUGGGGA CUGAUGAG X CGAA ICUUUGC	

Table 34

3476	CAAAGCC U CCCCACA	UGUGGG CUGAUGAG X CGAA IGCUTUG
3478	AAGCCUC C CCAACA	UGUGUG CUGAUGAG X CGAA IAGGCUU
3479	AGCCUCC C CACACAU	AUGUGUG CUGAUGAG X CGAA IGAAGCU
3480	GCUCUCC C ACACAUG	CAUGUGU CUGAUGAG X CGAA IGGAGGC
3481	CCUCCCC A CACAUGA	UCAUGUG CUGAUGAG X CGAA IGGGAGG
3483	UCCCCAC A CAUGACC	GGUCAUG CUGAUGAG X CGAA IUGGGGA
3485	CCACAC A UGACCCC	GGGUCA CUGAUGAG X CGAA IUGUGGG
3490	ACAUGAC C CCAGCCC	GGCUGG CUGAUGAG X CGAA IUCAGU
3491	CAUGACC C CAGCCCU	AGGCGUG CUGAUGAG X CGAA IUGCAUG
3492	AUGACCC C AGCCCUU	GAGGSCU CUGAUGAG X CGAA IGGUCAU
3493	UGACCCC A GCCCUCU	AGAGGGC CUGAUGAG X CGAA IGGGUCA
3496	CCCAGC C CUCUACA	UGUAGAG CUGAUGAG X CGAA ICUGGGG
3497	CCCAGCC C UCUCACG	CUGUAGA CUGAUGAG X CGAA IGCUGGG
3498	CCAGCCC U CUACAGC	GCUGUAG CUGAUGAG X CGAA IGGCUGG
3500	AGCCCUU U ACAGCGG	CCGCUGU CUGAUGAG X CGAA IAGGGCU
3503	CCUCUAC A GCGGUAC	GUACCGC CUGAUGAG X CGAA IUAGAGG
3511	GCGGUAC A GUGAGGA	UCCUCAC CUGAUGAG X CGAA IUACCGC
3520	UGAGGAC C CCACAGU	ACUGUGG CUGAUGAG X CGAA IUCCUCA
3521	GAGGACC C CACAGUA	UACUGUG CUGAUGAG X CGAA IGUCCUC
3522	AGGACCC C ACAGUAC	GUACUGU CUGAUGAG X CGAA IGGUCCU
3523	GGACCCC A CAGUACC	GGUACUG CUGAUGAG X CGAA IGGGUCC
3525	ACCCAC A GUACCCC	GGGUAC CUGAUGAG X CGAA IUGGGGU
3530	ACAGUAC C CCUGCCC	GGGCAGG CUGAUGAG X CGAA IUACUGU
3531	CAGUACC C CUGCCCU	AGGGCAG CUGAUGAG X CGAA IUGACUG
3532	AGUACCC C UGCCCCU	GAGGGCA CUGAUGAG X CGAA IGGUACU
3533	GUACCCC U GCCCUCU	AGAGGGC CUGAUGAG X CGAA IGGGUAC
3536	CCCUGC C CUCUAG	CUCAGAG CUGAUGAG X CGAA ICAGGGG
3537	CCCUGCC C UCUGAGA	UCUCAGA CUGAUGAG X CGAA IGCAGGG
3538	CCUGCCC U CUGAGAC	GUCUCAG CUGAUGAG X CGAA IGCACAG
3540	UGCCCUU U GAGACUG	CAGUCUC CUGAUGAG X CGAA IAGGGCA
3546	CUGAGAC U GAUGCCU	AGCCADC CUGAUGAG X CGAA IUCUCAG
3553	UGAUGG U ACUGUGC	GCAACGU CUGAUGAG X CGAA ICCAUCA
3561	ACGUGC C CCCCUGA	UCAGGGG CUGAUGAG X CGAA ICAACGU
3562	CGUGCC C CCGUAC	GUCAGGG CUGAUGAG X CGAA IGCACG
3563	GUUGCCC C CCUGACC	GGUCAGG CUGAUGAG X CGAA IGGCAAC
3564	UUGCCCC C CUGACCU	AGGUCAG CUGAUGAG X CGAA IGGGCAA
3565	UGCCCC C UGACCCUG	CAGGUCA CUGAUGAG X CGAA IGGGGCA
3566	GCCCCC U GACCUGC	GCAGGUC CUGAUGAG X CGAA IGGGGG
3570	CCUGAC C UGCAGCC	GGCUGCA CUGAUGAG X CGAA IUCAGGG
3571	CCUGACC U GCAGCCC	GGGCGUG CUGAUGAG X CGAA IUGCAGG
3574	GACCUGC A GCCCCCA	UGGGGGC CUGAUGAG X CGAA ICAGGUC
3577	CUGCAGC C CCCAGCC	GGCUGG CUGAUGAG X CGAA IUCAGG
3578	UGCAGCC C CCAGCCU	AGGCGUG CUGAUGAG X CGAA IGCUGCA
3579	GCAGCCC C CAGCCUG	CAGGCGU CUGAUGAG X CGAA IGGGUGC
3580	CAGCCCC C AGCCUGA	UCAGGCU CUGAUGAG X CGAA IGGGUG
3581	AGCCCC A GCGUGAA	UUCAGGC CUGAUGAG X CGAA IGGGGCU
3584	CCCAGC C UGAUUAU	AUAUCA CUGAUGAG X CGAA ICUGGGG

Table 34

3585	CCCAGCC U GAAUAG	CAUAUUC CUGAUGAG X CGAA IGCUGGG	
3598	UGUGAAC C AGCCAGA	UCUGGCU CUGAUGAG X CGAA IUUCACA	
3599	GUGAAC C GCCAGAU	AUCUGGC CUGAUGAG X CGAA IGUUCAC	
3602	AACCAGC C AGAUGU	AACAUCU CUGAUGAG X CGAA ICUGGUU	
3603	ACCAGCC A GAUGUUC	GAACAUC CUGAUGAG X CGAA IGCUGGU	
3614	GUUCGGC C CCAGCCC	GGGCUUG CUGAUGAG X CGAA ICCGAAC	
3615	UUCGGCC C CAGCCCC	GGGGCUU CUGAUGAG X CGAA IGCCGAA	
3616	UUGGCC C AGCCCCC	GGGCGCU CUGAUGAG X CGAA IGCCGAA	
3617	CGGCCCC A GCCCCCU	AGGGGCG CUGAUGAG X CGAA IGGSCCG	
3620	CCCAGC C CCUCUG	CGAAGGG CUGAUGAG X CGAA ICUGGGG	
3621	CCCAGCC C CCUCUG	GGGAAGG CUGAUGAG X CGAA IGCUUGG	
3622	CCAGCCC C CUUCGCC	GGCGAAG CUGAUGAG X CGAA IGCCUGG	
3623	CAGCCCC C UUCGCC	GGGCGAA CUGAUGAG X CGAA IGSGCUG	
3624	AGCCCC U UCGCCCC	GGGCGA CUGAUGAG X CGAA IGSGGCU	
3629	CCUUCGC C CCAGAG	CUUCUGG CUGAUGAG X CGAA ICGAAGG	
3630	CUUGGCC C CGAGAGG	CCUCUGG CUGAUGAG X CGAA IGCGGAA	
3631	UUCGCC C GAGAGG	CCUCUC CUGAUGAG X CGAA IGCGGAA	
3640	AGAGGCC C CUUCGCC	GGCAGAG CUGAUGAG X CGAA ICCUCU	
3641	GAGGCC C UCUGCCU	AGGCAGA CUGAUGAG X CGAA IGCCUC	
3642	AGGCCCC U CUGCCUG	CAGGCAG CUGAUGAG X CGAA IGCCCU	
3644	GGCCUUC U GCUUGCU	AGCAGGC CUGAUGAG X CGAA IAGGGCC	
3647	CCUCUGC C UGUCGCC	GGCAGCA CUGAUGAG X CGAA ICAGAGG	
3648	CUUCGCC U GCUGCC	GGGCAGC CUGAUGAG X CGAA ICAGAG	
3651	UGCCUGC U GCCCGAC	GUCGGGC CUGAUGAG X CGAA ICAGGCA	
3654	CUGCUGC C CGACCG	CAGGUCG CUGAUGAG X CGAA ICAGCAG	
3655	UGCUGCC C GACCUGC	GCAGGUC CUGAUGAG X CGAA ICAGGCA	
3659	GCCCGAC C UGUGGU	ACCAGCA CUGAUGAG X CGAA IUCGGGC	
3660	CCCAGCC U CGUGUG	CACCAGC CUGAUGAG X CGAA IGUCGGG	
3663	GACCUGC U GGUCCA	UGGCACC CUGAUGAG X CGAA ICAGGUC	
3669	CUGGUGC C ACUCUG	CCAGAGU CUGAUGAG X CGAA ICACCAG	
3670	UGGUGCC A CUCUGA	UCCAGAG CUGAUGAG X CGAA IGACCA	
3672	GUGCCAC U CUGAAA	UUUCCAG CUGAUGAG X CGAA IUGGCAC	
3674	GCCACUC U GGAAAG	CCUUUCC CUGAUGAG X CGAA IAGUGGC	
3683	GAAAGGC C CAAGACU	AGUCUUG CUGAUGAG X CGAA ICCUUC	
3684	AAAGGCC C AAGACUC	GAGUCUU CUGAUGAG X CGAA IGCCUUU	
3685	AAGGCC A AGACUCU	AGAGUCU CUGAUGAG X CGAA IGCCUUU	
3690	CCAAGAC U CUCUCC	GGGAGAG CUGAUGAG X CGAA IUUCUGG	
3692	AAGACUC U CUCCCCA	UGGGGAG CUGAUGAG X CGAA IAGUCUU	
3694	GACUCUC U CCCAGG	CCUGGGG CUGAUGAG X CGAA IAGAGUC	
3696	CUCUCUC C CCAGGA	UCCUGG CUGAUGAG X CGAA IAGAGAG	
3697	UCUCUCC C CAGGGA	UUCCUG CUGAUGAG X CGAA IAGAGA	
3698	CUCUCC C AGGGAAG	CUUCCU CUGAUGAG X CGAA IGGAGAG	
3699	UCUCCCC A GGAAGA	UCUUCC CUGAUGAG X CGAA IGGAGA	
3718	GGUGUC A AAGAGU	AGUCUU CUGAUGAG X CGAA IAGACC	
3732	UUUUUC C UUGGGG	CCCCAAA CUGAUGAG X CGAA ICAAAA	
3733	UUUGCC U UUGGGG	CCCCAAA CUGAUGAG X CGAA ICAAAA	
3744	GGGUGC C GUGAGA	UCCACC CUGAUGAG X CGAA ICACCCC	

Table 34

3754	GGAGAAC C CCGAGUA	UACUCGG CUGAUGAG X CGAA IUUCUCC
3755	GAGAACC C CGAGUAC	GUACUCG CUGAUGAG X CGAA IGUUCUC
3756	AGAACCC C GAGUACU	AGUACUC CUGAUGAG X CGAA IGGUUCU
3763	CGAGUAC U UGACACC	GGUGUCA CUGAUGAG X CGAA IUACUCG
3768	ACUUGAC A CCCCAGG	CCUGGGG CUGAUGAG X CGAA IUCAAGU
3770	UUGACAC C CCGAGGA	UCCUCGG CUGAUGAG X CGAA IUGUCAA
3771	UGACACC C CAGGGAG	CUCCUCG CUGAUGAG X CGAA IUGUGUA
3772	GACACCC C AGGGAGG	CCUCCUG CUGAUGAG X CGAA IGGUGUC
3773	ACACCCC A GGGAGGA	UCCUCCC CUGAUGAG X CGAA IGGUGU
3783	GAGGAGC U GCCCCUC	GAGGGGC CUGAUGAG X CGAA ICCCCUC
3786	GCUGCGC C CCUCAGC	GCUGAGG CUGAUGAG X CGAA ICGAGUC
3787	AGCUGCC C CUCAGCC	GCUGAG CUGAUGAG X CGAA ICGAGCU
3788	GCUGCCC C UCAGCCC	GGGCUGA CUGAUGAG X CGAA IGGCAGC
3789	CUGCCCC U CAGCCCC	GGGCUG CUGAUGAG X CGAA IGGCAG
3791	GCCCCUC A GCCCCAC	GUUGGGG CUGAUGAG X CGAA IAGGGGC
3794	CCUCAGC C CCACCCU	AGGUGGG CUGAUGAG X CGAA ICUGAGG
3795	CUCAGCC C CACCCUC	GAGGUGG CUGAUGAG X CGAA ICGUGAG
3796	UCAGCCC C ACCCUCC	GGAGGGU CUGAUGAG X CGAA IGGCUGA
3797	CAGCCCC A CCCUCCU	AGGAGGG CUGAUGAG X CGAA IGGCUG
3799	GCCCCAC C CUCCUCC	GGAGGAG CUGAUGAG X CGAA IUGGGGC
3800	CCCCACC C UCCUCCU	AGGAGGA CUGAUGAG X CGAA IUGGGGG
3801	CCCACCC U CCUCUCC	CAGGAGG CUGAUGAG X CGAA IGGUGGG
3803	CACCCUC C UCCUGCC	GGCAGGA CUGAUGAG X CGAA IAGGGUG
3804	ACCUCUC U CCUGCCU	AGGCAGG CUGAUGAG X CGAA IAGGGGU
3806	CCUCCUC C UGCCUUC	GAAGGCA CUGAUGAG X CGAA IAGGAGG
3807	CUCUCCU C GCUUUA	UGAAGGC CUGAUGAG X CGAA IAGGAG
3810	CUCUGCC C UUCAGCC	GGCUGAA CUGAUGAG X CGAA IAGGAG
3811	UCCUGCC U UCAGCCC	GGGUGA CUGAUGAG X CGAA IAGGAG
3814	UGCCUUC A GCCCAGC	GCUGGGC CUGAUGAG X CGAA IAGGACA
3817	CUUCAGC C CAGCCUU	AAGGCGU CUGAUGAG X CGAA ICUGAAG
3818	UUCAGCC C AGCCUUC	GAAGGCU CUGAUGAG X CGAA IGCUGAA
3819	UCAGCCC A GCUUCCG	CGAAGGC CUGAUGAG X CGAA IGCUGA
3822	GCCCAGC C UUCGACA	UGUGGAA CUGAUGAG X CGAA ICUGGGC
3823	CCAGGCC U UCGACAA	UUGUGCA CUGAUGAG X CGAA ICGUGGG
3829	CUUCGAC A ACCUCUA	UAGAGGU CUGAUGAG X CGAA IUCGAA
3832	CGACAAC C UCUAUUA	UAUAGA CUGAUGAG X CGAA IUUGUCG
3833	GACAACC U CUUUAUC	GUAAUAG CUGAUGAG X CGAA IGUUGUC
3835	CAACCCU U AUUACUG	CAGUAAU CUGAUGAG X CGAA IAGGUUG
3841	CUAUUAC U GGGACCA	UGGUCCC CUGAUGAG X CGAA IUAAUAG
3847	CUGGGAC C AGGACCC	GGGUCCU CUGAUGAG X CGAA IUCCCCG
3848	UGGGACC A GGACCCA	UUGGUCC CUGAUGAG X CGAA IUGUCCA
3853	CCAGGAC C CACCAGA	UCUGUGU CUGAUGAG X CGAA IUCCUGG
3854	CAGGACC C ACCAGAG	CUCUGGU CUGAUGAG X CGAA IUGUCCG
3855	AGGACCC A CCAAGAG	GCUCUGG CUGAUGAG X CGAA IGGUCCU
3857	GACCCAC C AGAGCCG	CCGUCU CUGAUGAG X CGAA IUGGGUC
3858	ACCCACC A GAGCGGG	CCCGCUC CUGAUGAG X CGAA IUGUGGU
3870	GGGGGGC U CCACCCA	UGGGUGG CUGAUGAG X CGAA ICCCCCC

Table 34

3872	GGGGCUC C ACCCAGC		GCUGGCU CUGAUGAG X CGAA IAGCCCC	
3873	GGGCUCC A CCCAGCA		UGCUGGG CUGAUGAG X CGAA IAGGCC	
3875	GUCCAC C CAGCACC		GGUGCUG CUGAUGAG X CGAA IUGGAGC	
3876	CUCCACC C AGCACCU		AGGUGCU CUGAUGAG X CGAA IUGGGAG	
3877	UCCACCC A GCACCUU		AAGGUGC CUGAUGAG X CGAA IGGUGGA	
3880	ACCCAGC A CCUCAA		UUGAAGG CUGAUGAG X CGAA IUGGGU	
3882	CCAGCAC C UUCAAG		CCUUGAA CUGAUGAG X CGAA IUGCUG	
3883	CAGCAAC U UCAAAGG		CCUUUGA CUGAUGAG X CGAA IUGGUCG	
3886	CACCUUC A AAGGGAC		GUCCUUU CUGAUGAG X CGAA IAGGGU	
3894	AAGGGAC A CCUACGG		CCGUAAG CUGAUGAG X CGAA IUCUUU	
3896	GGGACAC C UACGGCA		UGCUGUA CUGAUGAG X CGAA IUGUCC	
3897	GGACACC U ACGGCAG		CUGCCGU CUGAUGAG X CGAA IUGUCC	
3903	CUACGGC A GAGAACC		GGUUCUC CUGAUGAG X CGAA ICCGUAG	
3910	AGAGAAC C CAGAGUA		UACUCUG CUGAUGAG X CGAA IUUCUCU	
3911	GAGAAC C AGAGUAC		GUACUCU CUGAUGAG X CGAA IUGUUC	
3912	AGAACC A GAGUACC		GGUACUC CUGAUGAG X CGAA IGGUUCU	
3919	AGAGUAC C UGGGUCU		AGACCCA CUGAUGAG X CGAA IUACUCU	
3920	GAGUACC U GGGUCUG		CAGACCC CUGAUGAG X CGAA IUGUUCU	
3926	CUGGGUC U GAGCGUG		CAGGUCC CUGAUGAG X CGAA IACCCAG	
3935	GACGUGC C AGUGUGA		UCACACU CUGAUGAG X CGAA ICAGUUC	
3936	ACGUGCC A GUGUGAA		UUCACAC CUGAUGAG X CGAA IGCACGU	
3945	UUGGAAC C AGAAGGC		GCCUUCU CUGAUGAG X CGAA IUUCACA	
3946	GUGAAC C AAGAGCC		GGCCUUC CUGAUGAG X CGAA IGUUAC	
3953	AGAAGGC C AAGUCCG		CGGACUU CUGAUGAG X CGAA ICCUUCU	
3954	GAAAGCC A AGUCGCG		GCGGACU CUGAUGAG X CGAA IGGUUC	
3959	CCAAGUC C GCAGAA		CUUCUGC CUGAUGAG X CGAA IACUUGG	
3962	AGUCCGC A GAGGCC		GGGCUUC CUGAUGAG X CGAA ICCGACU	
3968	CAGAAGC C CUGAUGU		ACAUCAG CUGAUGAG X CGAA ICUCUCG	
3969	AGAAGCC C UGAUGUG		CACAUCA CUGAUGAG X CGAA IGCUCU	
3970	GAAAGCC U GAUGUGU		ACACAUC CUGAUGAG X CGAA IGGUUC	
3979	AUGUGUC C UCAGGGA		UCCUGUA CUGAUGAG X CGAA IACACAU	
3980	UGUGUCC U CAGGGAG		CUCCUGU CUGAUGAG X CGAA IGCACAC	
3982	UGUCCUC A GCGGCA		UGCUCUC CUGAUGAG X CGAA IAGGACA	
3989	AGGAGC A GGAAGG		CCUUCUC CUGAUGAG X CGAA ICUCUCU	
3998	GGAAGGC C UGACUUC		GAGUACA CUGAUGAG X CGAA ICUCUCC	
3999	GAAAGCC U GACUUCU		GAAGUUC CUGAUGAG X CGAA IGCUCUC	
4003	GCCUGAC U UCUGCUG		CAGCAGA CUGAUGAG X CGAA IUCAGGC	
4006	UGACUUC U GCUGGCA		UGCCAGC CUGAUGAG X CGAA IAGUACA	
4009	CUUCUGC U GCGAUCA		UGAUGCC CUGAUGAG X CGAA ICAGGAG	
4013	UGCUGGC A UCAAGAG		CUCUGUA CUGAUGAG X CGAA ICCAGCA	
4016	UGGCAUC A AGAGGUG		CACUUCU CUGAUGAG X CGAA IAGUCCA	
4031	GGAGGGC C CUCCGAC		GUCGGAG CUGAUGAG X CGAA ICCUCC	
4032	GAGGCCC C UCCGACC		GGUCGGA CUGAUGAG X CGAA IGCUCU	
4033	AGGGCCC U CCGACCA		UGGUCGG CUGAUGAG X CGAA IGGCCU	
4035	GGCCUUC C GACCACU		AGUGGUC CUGAUGAG X CGAA IAGGGCC	
4039	CUCCGAC C ACUCCA		UGGAAGU CUGAUGAG X CGAA IUCGGAG	
4040	UCCGACC A CUUCCAG		CUGGAAG CUGAUGAG X CGAA IUGCGGA	

Table 34

4042	CGACCAC U UCCAGGG		CCCUUGA CUGAUGAG X CGAA IUUGUCG	
4045	CCACUUC C AGGGGAA		UUCCCCU CUGAUGAG X CGAA IAGUGG	
4046	CACUUC A GGGGAAC		GUUCCCC CUGAUGAG X CGAA IGAAGUG	
4054	GGGGAAC C UGCCAUG		CAUGGCA CUGAUGAG X CGAA IUUCCCC	
4055	GGGAACC U GCCAUGC		GCAUGGC CUGAUGAG X CGAA IGUUCCC	
4058	AACUUGC C AUGCCAG		CUUGCAU CUGAUGAG X CGAA ICAGGUU	
4059	ACCUGCC A UGCCAGG		CCUGGCA CUGAUGAG X CGAA IGCAGGU	
4063	GCCAUGC C AGGAACC		GUUCCU CUGAUGAG X CGAA ICAUUGC	
4064	CCAUGCC A GGAACCU		AGGUUCC CUGAUGAG X CGAA IGCAUGG	
4070	CAGGAAC C UGUCCUA		UAGGACA CUGAUGAG X CGAA IUUCCUG	
4071	AGGAACC U GUCCUAA		UUAGGAC CUGAUGAG X CGAA IGUUCU	
4075	ACCUGUC C UAAGGAA		UUCCUUA CUGAUGAG X CGAA IACAGGU	
4076	CCUUGCC U AAGGAAC		GUUCCU CUGAUGAG X CGAA IGACAGG	
4084	AAGGAAC C UUCCUUC		GAAGGAA CUGAUGAG X CGAA IUUCCU	
4085	AGGAACC U UCCUUC		GGAAGGA CUGAUGAG X CGAA IGUUCU	
4088	AACUUC C UUCUUC		GCAGGAA CUGAUGAG X CGAA IAGGUU	
4089	ACCUUC C UCCUGCU		AGCAGGA CUGAUGAG X CGAA IGAAGGU	
4092	UUCCUUC C UGUUGA		UCAAGCA CUGAUGAG X CGAA IAAAGGA	
4093	UUCUUC C UGUUGAG		CUCAAGC CUGAUGAG X CGAA IGAAGGA	
4096	UUCCUG C UGAGUUC		GAACUCA CUGAUGAG X CGAA ICAGGAA	
4104	UGAGUUC C CAGAUGG		CCAUCUG CUGAUGAG X CGAA IAAUCA	
4105	GAGUUC C AGAUGGC		GCCAUCU CUGAUGAG X CGAA IGAACUC	
4106	AGUUC C A GAUGGCU		AGCCAUC CUGAUGAG X CGAA IGGAACU	
4113	AGAUGGC U GGAAGGG		CCCUUCC CUGAUGAG X CGAA ICCAUCU	
4124	AGGGGUC C AGCCUCG		CGAGGCU CUGAUGAG X CGAA IACCCU	
4125	GGGUGCC A GCUUCGU		ACGAGGC CUGAUGAG X CGAA IGACCCC	
4128	GUCCAGC C UCGUUGG		CCAACGA CUGAUGAG X CGAA ICUGGAC	
4129	UCCAGCC U CGUUGGA		UCCAACG CUGAUGAG X CGAA ICGUGA	
4145	GAGGAAC A GCACUGG		CCAGUGC CUGAUGAG X CGAA IUUCUC	
4148	GAACAGC A CUGGGGA		UCCCCAG CUGAUGAG X CGAA ICUGUUC	
4150	ACAGCAC U GGGGAGU		ACUCCCC CUGAUGAG X CGAA IUGCUU	
4159	GGGAGUC U UUGUGGA		UCCACAA CUGAUGAG X CGAA IACUCCC	
4170	UGGAUUC U GAGGCC		GGGCCUC CUGAUGAG X CGAA IAAUCCA	
4176	CUGAGGC C UGCCCCA		UGGGCAG CUGAUGAG X CGAA ICCUCAG	
4177	UGAGGCC C UGCCCAA		UUGGGCA CUGAUGAG X CGAA IGCCUCA	
4178	GAGGCC C GCCCAU		AUUGGC CUGAUGAG X CGAA IGGCCUC	
4181	GCCUUC C CAUAGAG		CUCAUUG CUGAUGAG X CGAA ICAGGCG	
4182	CCUUGCC C AAUGAGA		UCUCAU CUGAUGAG X CGAA IGCAGGG	
4183	CCUGCCC A AUGAGAC		GUUCAU CUGAUGAG X CGAA IGGCAGG	
4191	AUGAGAC U CUAGGGU		ACCCUAG CUGAUGAG X CGAA IUUCU	
4193	GAGACU C AUGGUCC		GGACCCU CUGAUGAG X CGAA IAGUCU	
4200	UAGGUUC C AGUGGAU		AUCCACU CUGAUGAG X CGAA IACCCUA	
4201	AGGGUCC A GUGGAUG		CAUCCAC CUGAUGAG X CGAA IGACCCU	
4210	UGGAUGC C ACAGCCC		GGGCUU CUGAUGAG X CGAA ICAUCCA	
4211	GGAUGCC A CAGCCCA		UGGGCUG CUGAUGAG X CGAA IGAUCC	
4213	AUGCCAC A GCCCAGC		GCUGGCC CUGAUGAG X CGAA IUGGCAU	
4216	CCACAGC C CAGCUUG		CAAGCUG CUGAUGAG X CGAA ICUGUGG	

Table 34

4217	CACAGCC C AGCUUGG		CCAAGCU CUGAUGAG X CGAA IGCUGUG
4218	ACAGCCC A GCUUGGC		GCCAAAGC CUGAUGAG X CGAA IGGCUUG
4221	GCCAGCC U UGGCCCU		AGGGCCA CUGAUGAG X CGAA ICGGGC
4226	GCUUGGC C CUUUCU		AGGAAGC CUGAUGAG X CGAA ICCAAGC
4227	CUUGGCC C UUUCCUU		AAGGAAA CUGAUGAG X CGAA IGCCAAG
4228	UUGGCC C UUUCCUU		GAAGGAA CUGAUGAG X CGAA IGGCCAA
4232	CCCUUUC C UUCCAGA		UCUGGAA CUGAUGAG X CGAA IAAAGGG
4233	CCUUUCC U UCCAGAU		AUCUGGA CUGAUGAG X CGAA IGAAAGG
4236	UUCCUUC C AGAUCCU		AGGAUUC CUGAUGAG X CGAA IAGGAA
4237	UCCUUC A GAUCCUG		CAGGAUC CUGAUGAG X CGAA IGAAGGA
4242	CCAGAU C UGGGUAC		GUACCCA CUGAUGAG X CGAA IAUUCUG
4243	CAGAUCC U GGGUACU		AGUACCC CUGAUGAG X CGAA IGAUCCG
4250	UGGGUAC U GAAAGCC		GGCUUUC CUGAUGAG X CGAA IUACCCA
4257	UAGAAAG C UUAAGGA		UCCCUAA CUGAUGAG X CGAA ICUUUA
4258	GAAAGCC U UAGGGAA		UUCCCUA CUGAUGAG X CGAA IGCUUUC
4268	GGGAAGC U GGCCUGA		UCAGGCC CUGAUGAG X CGAA ICUUCC
4272	AGCUGGC C UGAAGGG		CCUCUCA CUGAUGAG X CGAA ICCAGCU
4273	GCUGGCC U GAGAGGG		CCUCUC CUGAUGAG X CGAA IGGCAGC
4289	AAGCGGC C CUAAGGG		CCCUUAG CUGAUGAG X CGAA ICCGCU
4290	AGCGGCC C UAAGGGA		UCCCUUA CUGAUGAG X CGAA IGGCGCU
4291	GCGGCCC U AAGGGAG		CUCCCUU CUGAUGAG X CGAA IGGCGC
4303	GAGUGUC U AAGAAC		UGUUCU CUGAUGAG X CGAA IACACUC
4310	UAGAAC A AAGCGA		UCGCUU CUGAUGAG X CGAA IUUUCUA
4319	AAGCGAC C CAUUCAG		CUGAAUG CUGAUGAG X CGAA IUUCGU
4320	AGCGACC C AUUCAGA		UCUGAAU CUGAUGAG X CGAA IUGGCU
4321	GCAGCCC A UUCAGAG		CUUGAA CUGAUGAG X CGAA IGGUCC
4325	CCCAUUC A GAGACUG		CAGUUC CUGAUGAG X CGAA IAAUGGG
4331	CAGAGAC U GUCCUG		CAGGGAC CUGAUGAG X CGAA IUUCUG
4335	GACUGUC C CUGAAC		GUUUCAG CUGAUGAG X CGAA IACAGUC
4336	ACUGUCC C UGAAACC		GGUUCUA CUGAUGAG X CGAA IGACAGU
4337	CUGUCCC U GAAACCU		AGGUUC CUGAUGAG X CGAA IGGACAG
4343	CUGAAC C UAGUACU		AGUACUA CUGAUGAG X CGAA IUUUCAG
4344	UGAAACC U AGUACUG		CAGUACU CUGAUGAG X CGAA IGUUCU
4350	CUGUAC U GCGCCC		GGGGGG CUGAUGAG X CGAA IUACUAG
4353	GUACUGC C CCGCAUG		CAUGGG CUGAUGAG X CGAA ICAUAGC
4354	UACUGCC C CCGAUGA		UCAUGGG CUGAUGAG X CGAA IGCAGUA
4355	ACUGCCC C CCAUGAG		CUCAUG CUGAUGAG X CGAA IGGCAGU
4356	CGCCCC C CAUGAGG		CCUCAUG CUGAUGAG X CGAA IGGGAC
4357	UGCCCC C AUGAGGA		UCCUCAU CUGAUGAG X CGAA IGGGCA
4358	GCCCCC A UGAGGAA		UUCCUCA CUGAUGAG X CGAA IGGGGC
4371	AAGGAAC A GCAUUGG		CCAUUGC CUGAUGAG X CGAA IUUCCUU
4374	GAACAGC A AUGGUGU		ACACCAU CUGAUGAG X CGAA ICGUUC
4383	UGGUGUC A GUAUCCA		UGGAUUC CUGAUGAG X CGAA IACACCA
4389	CAGAUUC C AGGCUUU		AAAGCCU CUGAUGAG X CGAA IAUACUG
4390	AGUAUCC A GGUUUU		CAAGCC CUGAUGAG X CGAA IGAUACU
4394	UCCAGGC U UUGUACA		UGUACAA CUGAUGAG X CGAA ICCUGGA
4401	UUUGUAC A GAGUGCU		AGCACUC CUGAUGAG X CGAA IUACAAA

Table 34

4408	AGAGUGC U UUUUCUGU		ACAGAAA CUGAUGAG X CGAA ICACUCU	
4413	GCUUUUC U GUUUUAGU		ACUAAAC CUGAUGAG X CGAA IAAAAGC	
4427	UUUUUAC U UUUUUUG		CAAAAAA CUGAUGAG X CGAA IUAAAAA	
4464	UAAAGAC C CAGGGGG		CCCCCUG CUGAUGAG X CGAA IUCUUUA	
4465	AAAGACC C AGGGGGA		UCCCCCU CUGAUGAG X CGAA IGUCUUU	
4466	AAGACCC A GGGGGAG		CUCCCCC CUGAUGAG X CGAA IGGUCUU	

Seq Accession No. = HSERB2R (Human c-erb-B-2 mRNA; 4473 bp)

Core Sequence = CUGAUGAG X CGAA (X = GCCGAAAGGC or other stem II)

Table 35

Table 35: HBV Strains and Accession numbers

Accession Number	Name
AF100308.1	AF100308 Hepatitis B virus strain 2-18, complete
AB026815.1	AB026815 Hepatitis B virus DNA, complete genome,
AB033559.1	AB033559 Hepatitis B virus DNA, complete genome,
AB033558.1	AB033558 Hepatitis B virus DNA, complete genome,
AB033557.1	AB033557 Hepatitis B virus DNA, complete genome,
AB033556.1	AB033556 Hepatitis B virus DNA, complete genome,
AB033555.1	AB033555 Hepatitis B virus DNA, complete genome,
AB033554.1	AB033554 Hepatitis B virus DNA, complete genome,
AB033553.1	AB033553 Hepatitis B virus DNA, complete genome,
AB033552.1	AB033552 Hepatitis B virus DNA, complete genome,
AB033551.1	AB033551 Hepatitis B virus DNA, complete genome,
AB033550.1	AB033550 Hepatitis B virus DNA, complete genome
AF143308.1	AF143308 Hepatitis B virus clone WB1254, complete
AF143307.1	AF143307 Hepatitis B virus clone RM518, complete
AF143306.1	AF143306 Hepatitis B virus clone RM517, complete
AF143305.1	AF143305 Hepatitis B virus clone RM501, complete
AF143304.1	AF143304 Hepatitis B virus clone HD319, complete
AF143303.1	AF143303 Hepatitis B virus clone HD1406, complete
AF143302.1	AF143302 Hepatitis B virus clone HD1402, complete
AF143301.1	AF143301 Hepatitis B virus clone BW1903, complete
AF143300.1	AF143300 Hepatitis B virus clone 7832-G4, complete
AF143299.1	AF143299 Hepatitis B virus clone 7744-G9, complete
AF143298.1	AF143298 Hepatitis B virus clone 7720-G8, complete
AB026814.1	AB026814 Hepatitis B virus DNA, complete genome,
AB026813.1	AB026813 Hepatitis B virus DNA, complete genome,
AB026812.1	AB026812 Hepatitis B virus DNA, complete genome,
AB026811.1	AB026811 Hepatitis B virus DNA, complete genome,
AJ131956.1	HBV131956 Hepatitis B virus complete genome,
AF151735.1	AF151735 Hepatitis B virus, complete genome
AF090842.1	AF090842 Hepatitis B virus strain G5.27295, complete
AF090841.1	AF090841 Hepatitis B virus strain G4.27241, complete
AF090840.1	AF090840 Hepatitis B virus strain G3.27270, complete
AF090839.1	AF090839 Hepatitis B virus strain G2.27246, complete
AF090838.1	AF090838 Hepatitis B virus strain P1.27239, complete
Y18858.1	HBV18858 Hepatitis B virus complete genome, isolate
Y18857.1	HBV18857 Hepatitis B virus complete genome, isolate
D12980.1	HPBCG Hepatitis B virus subtype adr(SRADR) DNA,
Y18856.1	HBV18856 Hepatitis B virus complete genome, isolate
Y18855.1	HBV18855 Hepatitis B virus complete genome, isolate
AJ131133.1	HBV131133 Hepatitis B virus, complete genome, strain
X80925.1	HBVP6PCXX Hepatitis B virus (patient 6) complete
X80926.1	HBVP5PCXX Hepatitis B virus (patient 5) complete
X80924.1	HBVP4PCXX Hepatitis B virus (patient 4) complete
AF100309.1	Hepatitis B virus strain 56, complete genome

Table 35

AF068756.1	AF068756 Hepatitis B virus, complete genome
AF043593.1	AF043593 Hepatitis B virus isolate 6/89, complete
Y07587.1	HBVAYWGEN Hepatitis B virus, complete genome
D28880.1	D28880 Hepatitis B virus DNA, complete genome, strain
X98076.1	HBVDEFVP3 Hepatitis B virus complete genome with
X98075.1	HBVDEFVP2 Hepatitis B virus complete genome with
X98074.1	HBVDEFVP1 Hepatitis B virus complete genome with
X98077.1	HBVCGWITY Hepatitis B virus complete genome, wild type
X98072.1	HBVCGINSC Hepatitis B virus complete genome with
X98073.1	HBVCGINCX Hepatitis B virus complete genome with
U95551.1	U95551 Hepatitis B virus subtype ayw, complete genome
D23684.1	HPBC6T588 Hepatitis B virus (C6-TKB588) complete genome
D23683.1	HPBC5HKO2 Hepatitis B virus (C5-HBVKO2) complete genome
D23682.1	HPBB5HKO1 Hepatitis B virus (B5-HBVKO1) complete genome
D23681.1	HPBC4HST2 Hepatitis B virus (C4-HBVST2) complete genome
D23680.1	HPBB4HST1 Hepatitis B virus (B4-HBVST1) complete genome
D00331.1	HPBADW3 Hepatitis B virus genome, complete genome
D00330.1	HPBADW2 Hepatitis B virus genome, complete genome
D50489.1	HPBA11A Hepatitis B virus DNA, complete genome
D23679.1	HPBA3HMS2 Hepatitis B virus (A3-HBVMS2) complete genome
D23678.1	HPBA2HYS2 Hepatitis B virus (A2-HBVYS2) complete genome
D23677.1	HPBA1HKK2 Hepatitis B virus (A1-HBVKK2) complete genome
D16665.1	HPBADRM Hepatitis B virus DNA, complete genome
D00329.1	HPBADW1 Hepatitis B virus (HBV) genome, complete genome
X97851.1	HBVP6CSX Hepatitis B virus (patient 6) complete genome
X97850.1	HBVP4CSX Hepatitis B virus (patient 4) complete genome
X97849.1	HBVP3CSX Hepatitis B virus (patient 3) complete genome
X97848.1	HBVP2CSX Hepatitis B virus (patient 2) complete genome
X51970.1	HVHEPB Hepatitis B virus (HBV 991) complete genome
M38636.1	HPBCGADR Hepatitis B virus, subtype adr, complete genome
X59795.1	HBVAYWMCG Hepatitis B virus (ayw subtype mutant)
M38454.1	HPBADRICG Hepatitis B virus, complete genome
M32138.1	HPBHBVAA Hepatitis B virus variant HBV-alpha1, complete
J02203.1	HPBAYW Human hepatitis B virus (subtype ayw), complete
M12906.1	HPBADRA Hepatitis B virus subtype adr, complete genome
M54923.1	HPBADWZ Hepatitis B virus (subtype adw), complete genome
L27106.1	HPBMUT Hepatitis B virus mutant complete genome

Table 36

Table 36: HBV Substrate Sequence

NT Position*	Substrate	Seq ID
82	CUAUCGUGCCCUUCUCAUC	1
101	CUACCGUUCGGCC	2
159	CUUCUCAUCU	3
184	CUUCCCUACAC	4
269	GACUCUCAGAAUGUCAACGAC	5
381	CUGUAGGCAUAAUUGGUCUG	6
401	GUUCACCAGCACCAUGCAACUUUUU	7
424	UUUCACGUCUGCCUAAUCAUC	8
524	AUUUGGAGCUUC	9
562	CUGACUUCUUCCUUCUAUUC	10
649	CUCACCAUACCGCACUCA	11
667	GGCAAGCUAUUCUGUG	12
717	GGAAGUAAUUGGAAGAC	13
758	CAGCUAUGUCAUGUUA	14
783	CUAAAAUCGGCCUAAAAUCAGAC	15
812	CAUUUCCUGUCUCACUUUUGGAAGAG	16
887	UCCUGCUUACAGAC	17
922	CAACACUUCGGAAACUACUGUUGUUG	18
989	CUCGCCUCGACAGCAAGGUCUC	19
1009	CAAUCGCCGCGUCGAGAAG	20
1031	AUCUCAAUCUCGGAAUCUCAA	21
1052	AUGUAGUAUCCCUUGGACUC	22
1072	CAUAAGGUGGAAACUUUACUG	23
1109	CUGUACCUAUUCUUUAAAUCC	24
1127	CUGAGUGGCAACUCCC	25
1271	CCAAAUACUGCCCUUGGACAA	26
1297	AUUAACCAUAUUAUCCUGAACA	27
1319	AUGCAGUUAUACUAUUAUCAAACUA	28
1340	AAACUAGGCAUA	29
1370	AGCGGGCAUUCUAUUAUAGAGAG	30
1393	GAAACUACGCGCAGCGCCUCAUUUUGU	31
1412	CAUUUUGUGGUCACCAUA	32
1441	CAAGAGCUACAGCAUGGG	33

LOCUS HPBADR1CG 3221 bp DNA circular VRL
 06-MAR-1995
 DEFINITION Hepatitis B virus , complete genome.
 ACCESSION M38454

*The nucleotide number referred to in that table is the position of the 5' end of the oligo in this sequence.

Table 37

Table 37: Human HBV Hammerhead Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
13	CCACCCT T TCACCAA	34	UUGGUGGA CUGAUGAG X CGAA AGUGGUGG	2543
14	CACCACTT T CACCAAAA	35	UUUGUGGG CUGAUGAG X CGAA AAGUGGUG	2544
15	ACCACCTT C CACCAAAC	36	GUUUGUGG CUGAUGAG X CGAA AAGUGGUG	2545
25	ACCAAACT C TTCAAGAT	37	AUCUUGAA CUGAUGAG X CGAA AGAGUUUG	2546
27	CAAACTCT T CAAGATCC	38	GGAUUCUG CUGAUGAG X CGAA AAGAGUUU	2547
28	AAACTCTT C AAGATCCC	39	GGGAUCUU CUGAUGAG X CGAA AAGAGUUU	2548
34	TTCAAGAT C CCAGAGTC	40	GACUCUGG CUGAUGAG X CGAA ACUCUGAA	2549
42	CCCAAGAT C AGGGCCCT	41	AGGGCCCU CUGAUGAG X CGAA ACUCUGGG	2550
53	GGCCCTGT A CTTTCTGT	42	CAGGAAAG CUGAUGAG X CGAA AGUACAGG	2551
56	CTGTACT T TCTGTCTG	43	CAGCAGGA CUGAUGAG X CGAA AAGUACAG	2552
57	CTGTACTT T CTTGTCTG	44	CCAGCAGG CUGAUGAG X CGAA AAGUACAG	2553
58	TGTACTTT C CTGTCTGT	45	ACCAGCAG CUGAUGAG X CGAA AAAGUACA	2554
71	TGGTGGCT C CAGTTCAG	46	CUGAACUG CUGAUGAG X CGAA AGCCACCA	2555
76	GTCCCAAT T CAGGAACA	47	UGUUCUG CUGAUGAG X CGAA AACUGGAG	2556
77	CTCAGATT C AGGAACAG	48	CUGUUCU CUGAUGAG X CGAA AACUGGAG	2557
97	GGCCTGCT C AGAATACT	49	AGUAUUCU CUGAUGAG X CGAA AGCAGGGC	2558
103	CTCAGAAT A CTGTCTCT	50	AGAGACAG CUGAUGAG X CGAA AUUCUGAG	2559
108	AATACTGT C TGTGCCAT	51	AUGGCAGA CUGAUGAG X CGAA ACAGUAUU	2560
110	TACTGTCT C TGCCATAT	52	AUAUGGCA CUGAUGAG X CGAA AUGGCAGA	2561
117	TCTGCCAT A TGCTCAAT	53	AUTGACGA CUGAUGAG X CGAA AUGGCAGA	2562
119	TGCCATAT C GTCAATCT	54	AGAUAUAG CUGAUGAG X CGAA AUAUGGCA	2563
122	CATATGCT C AATCTTAT	55	AUAAGAUU CUGAUGAG X CGAA ACAGUAUG	2564
126	TGTCAAT C TTATCGAA	56	UUCGAAUA CUGAUGAG X CGAA AUUGACGA	2565
128	GTCATCTT A ATCGAAGA	57	UCUUCGAU CUGAUGAG X CGAA AGAUUAGC	2566
129	TCAATCTT A TCGAAGAC	58	GUCUUGCA CUGAUGAG X CGAA AAGAUUGA	2567
131	AATCTTAT C GAAGACTG	59	CAGUUCUC CUGAUGAG X CGAA AUAAGAUU	2568
150	GACCCCTG A CCGAACAT	60	AUGUUCGG CUGAUGAG X CGAA ACAGGGUC	2569
168	GAGAACAT C GCATCAGG	61	CCUGAUGC CUGAUGAG X CGAA AUGUUCUC	2570
173	CTACGACT C AGGACTCC	62	GGAGUCCU CUGAUGAG X CGAA AUGCGAUG	2571
180	TCAGGACT C CTAGGACC	63	GGUCCUAG CUGAUGAG X CGAA AGUCCUGA	2572
183	GGACTCCT A GGAACCTT	64	AGGGGUCC CUGAUGAG X CGAA AGGAGUCC	2573
195	CCCTCTGT C GTGTATCA	65	UGUAACAC CUGAUGAG X CGAA AGCAGGGG	2574
200	GCTCGTGT T ACAGGCGG	66	CCGCCUGU CUGAUGAG X CGAA ACAAGAGC	2575
201	CTCGTGT T CAGGCGGG	67	CCGCCUGU CUGAUGAG X CGAA ACAAGAGC	2576
212	GGCGGGGT T TTTCTTGT	68	ACAAGAAA CUGAUGAG X CGAA ACCCCCGC	2577
213	GGCGGGGT T TTTCTTGT	69	AACAAGAA CUGAUGAG X CGAA AACCCCGC	2578
214	GGGGTGT T TCTTGTGT	70	CAACAAGA CUGAUGAG X CGAA AAACCCCG	2579
215	GGGGTGT T TCTTGTGA	71	UCAACAAG CUGAUGAG X CGAA AAACCCCG	2580
216	GGGGTGT T TGTGTGAC	72	GUCACAAA CUGAUGAG X CGAA AAAAAACC	2581
218	GTTTTTCT T GTTGACAA	73	UUGUCAAC CUGAUGAG X CGAA AGAAAAAC	2582
221	TTTCTGT T GACAAAAA	74	UUUUUGUC CUGAUGAG X CGAA ACAAGAAA	2583
231	ACAAAAAT C CTCACAT	75	AUUUGAG CUGAUGAG X CGAA AUUUUUUG	2584
234	AAAAATCT C ACAATACC	76	GGUAUUUG CUGAUGAG X CGAA AGGAUUUU	2585
240	CTCACAAT A CCAACAGG	77	CUCUGUGG CUGAUGAG X CGAA AUUGUGAG	2586
250	CACAGAGT C TAGACTCG	78	CGAGUCUA CUGAUGAG X CGAA ACUCUGUG	2587
252	CAGAGTCT A GACTCTGT	79	CACGAGUC CUGAUGAG X CGAA AGACUCUG	2588
257	TCTAGACT C GTGGTGGG	80	UCCACCAC CUGAUGAG X CGAA AGUCUAGA	2589
268	GOTGGACT T CTCTCAAT	81	AUUGAGAG CUGAUGAG X CGAA AGUCCACC	2590

Table 37

269	GTGGACTT C TCTCAATT	82	AAUUGAGA CUGAUGAG X CGAA AAGUCCAC	2591
271	GGACTTCT C TCAATTTT	83	AAAAUUGA CUGAUGAG X CGAA AGAAGUCC	2592
273	ACTTCTCT C AATTTTCT	84	AGAAAAUUGA CUGAUGAG X CGAA AGAAGAU	2593
277	CTCTCAAT T TTCTAGGG	85	CCCUAGAA CUGAUGAG X CGAA AUUGAGAG	2594
278	TCTCAATT T TCTAGGGG	86	CCCCUAGA CUGAUGAG X CGAA AAUUGAGA	2595
279	CTCAATTT T CTAGGGGG	87	CCCCCUAG CUGAUGAG X CGAA AAAUUGAG	2596
280	TCAATTTT C TAGGGGGA	88	UCCCCCUA CUGAUGAG X CGAA AAAUUGA	2597
282	AATTTTCT A GGGGGAAC	89	GUUCCCCC CUGAUGAG X CGAA AGAAAAUUG	2598
301	CGTGTGT C TTGGCCAA	90	UUGGCCAA CUGAUGAG X CGAA ACACACGG	2599
303	GTGTGTCT T GGCACAAA	91	UUUUGGCC CUGAUGAG X CGAA AGACACAC	2600
313	GCACAAAT T CGAGTCC	92	GGACUCCG CUGAUGAG X CGAA AUUUUGGC	2601
314	CCAAAAAT C CGAGTCCC	93	GGGACUCG CUGAUGAG X CGAA AAUUUGGG	2602
320	TTCCGAGT C CCAATCT	94	AGAUUUGG CUGAUGAG X CGAA ACUGCGAA	2603
327	TCCCAAT C TCCAGTCA	95	UGACUGGA CUGAUGAG X CGAA AUUUUGGA	2604
329	CCAAATCT C CAATTCACT	96	AGUGACUG CUGAUGAG X CGAA AGAUUUUG	2605
334	TCTCCAGT C ACTACCA	97	UGGUGAGU CUGAUGAG X CGAA ACUGGAGA	2606
338	CAGTCACT C ACCAACCT	98	AGGUUGGU CUGAUGAG X CGAA AAUUGACUG	2607
349	CAACCTGT T GTCCTCCA	99	UGGAGGAC CUGAUGAG X CGAA ACAGGUUG	2608
352	CTGTGTCT C CTCCAATT	100	AAUUGGAG CUGAUGAG X CGAA ACAACAGG	2609
355	GTGTGTCT C CAATTGT	101	ACAAAUUG CUGAUGAG X CGAA AGACACAG	2610
360	CCTCCAAT T TGTCTGG	102	CCAGGACA CUGAUGAG X CGAA AUUGGAGG	2611
361	CTCCAATT T GTCCTGGT	103	ACCAGGAC CUGAUGAG X CGAA AAUUGGAG	2612
364	CAATTGTCT C CTGGTTAT	104	AUAACCCG CUGAUGAG X CGAA ACAAUUG	2613
370	GTCTGTGT T ATCGTGA	105	CCAGCGAU CUGAUGAG X CGAA ACCAGGAC	2614
371	TTCTGGTT T TCTCTGGA	106	UCCAGCGA CUGAUGAG X CGAA AACCAGGA	2615
373	CTGGTTAT C GCTGATG	107	CAUCCAGC CUGAUGAG X CGAA AUAACCCAG	2616
385	GGATGTGT C TGGCGGCT	108	ACGCCGCA CUGAUGAG X CGAA ACACAUC	2617
394	TGCGGCGT T TTATCATC	109	GAGUAUAA CUGAUGAG X CGAA ACGCCGCA	2618
395	GCGGCGTT T TATCATCT	110	AGAUGAUA CUGAUGAG X CGAA AACGCCG	2619
396	GCGGTTT T ATCATCTT	111	AAGAUGAU CUGAUGAG X CGAA AAGGCCG	2620
397	GCGGTTT T TCATCTTC	112	GAAGAUGA CUGAUGAG X CGAA AAAACGCC	2621
399	CGTTTAT C ATCTTCCT	113	AGGAAGAU CUGAUGAG X CGAA AUAAAACG	2622
402	TTATCATC T TCTCTCTG	114	CAGAGGAA CUGAUGAG X CGAA AUGAUAAA	2623
404	TATCATCT C CTCCTGCA	115	UGCAGAGG CUGAUGAG X CGAA AGAUGAUA	2624
405	ATCATCTT C TCTGCAT	116	AUGCAGAG CUGAUGAG X CGAA AAGAUGAU	2625
408	ATCTTCTT C TGCATCTT	117	AGGAUGCA CUGAUGAG X CGAA AGGAAGAU	2626
414	CTCTGCAT C CTGCTGCT	118	AGCAGCAG CUGAUGAG X CGAA AUGCAGAG	2627
423	CTGCTGCT A TGCTGCT	119	AUGAGGCA CUGAUGAG X CGAA AGCAGCAG	2628
429	CTGCTGCT C ATCTTCTT	120	AAGAAGAU CUGAUGAG X CGAA AGGCAUAG	2629
432	TGCTGCT C TTCTTGTT	121	AACAAGAA CUGAUGAG X CGAA AUGAGCCA	2630
434	CCTCATCT T CTGTGTGG	122	CCAACAAG CUGAUGAG X CGAA AAGUGAGG	2631
435	CTCATCTT C TTGTGTGT	123	ACCAACAA CUGAUGAG X CGAA AAGAUGAG	2632
437	CATCTTCT T GTTGTGTC	124	GAAACCAAC CUGAUGAG X CGAA AGAAGAU	2633
440	CTCTTCTT T GTTCTCTC	125	GAAAGACC CUGAUGAG X CGAA ACAAGAG	2634
444	TGTTGGT T TCTCTGCA	126	UCCAGAG CUGAUGAG X CGAA ACCAACAA	2635
445	TGTTGGTT C TTCTGAC	127	GUCCAGAA CUGAUGAG X CGAA AACCACAA	2636
447	TGTTTCT T CTGACTA	128	UAGUCCAG CUGAUGAG X CGAA AGAACCAA	2637
448	TGTTTCTT C TGACTAT	129	AUAGUCCA CUGAUGAG X CGAA AAGAACCA	2638
455	TCTGGACT A TCAAGGTA	130	UACCUUGA CUGAUGAG X CGAA AGUCCAGA	2639
457	TGCACTAT C AAGGATAG	131	CAUACCUU CUGAUGAG X CGAA AUAGUCCA	2640
463	ATCAAGGT A TGTGCCCC	132	GGGCAACA CUGAUGAG X CGAA ACCUUGAU	2641

Table 3/

467	AGGTATGT	T	GCCCGTTT	133	AAACGGGC	CUGAUGAG	X	CGAA	ACAUACCU	2642
474	TGCCCCGT	T	TGCTCTCT	134	AGAGGACA	CUGAUGAG	X	CGAA	ACGGGCAA	2643
475	TGCCCCGT	T	GTCTCTCT	135	UAGAGGAC	CUGAUGAG	X	CGAA	AACGGGCA	2644
478	CCGTTTGT	C	CTCTAATT	136	AAUUAAGG	CUGAUGAG	X	CGAA	ACAAACGG	2645
481	TTTGTCTCT	C	TAATTCCTA	137	UGAAAUUA	CUGAUGAG	X	CGAA	AGGACAAA	2646
483	TGTCCTCT	A	ATTCAGAG	138	CCUGGAUU	CUGAUGAG	X	CGAA	AGAGGACA	2647
486	CTCTTAAT	T	CCAGGATC	139	GAUCCUGG	CUGAUGAG	X	CGAA	AUUGAGAG	2648
487	CTCTAATT	C	CAGGATCA	140	UGAUCUUG	CUGAUGAG	X	CGAA	AUUAAGAG	2649
494	TCCAGGAT	C	ATCAACAA	141	UUGUUGAU	CUGAUGAG	X	CGAA	AUCCUGGA	2650
497	AGGATCAT	C	AACAACCA	142	UGGUUGUU	CUGAUGAG	X	CGAA	AUGAUCUU	2651
535	GCACAACT	C	CTGCTCAA	143	UUGAGCAG	CUGAUGAG	X	CGAA	AGUUGUCC	2652
541	CTCTGTGT	C	AAGGAATC	144	GGUUCUUU	CUGAUGAG	X	CGAA	ACGAGGAG	2653
551	AGGAACCT	C	TATGTTTC	145	GAACAUAU	CUGAUGAG	X	CGAA	AGGUUCCU	2654
553	GAACCTCT	A	TGTTTCCC	146	GGGAAACA	CUGAUGAG	X	CGAA	AGAGGUUC	2655
557	CTCTATGT	T	TCCCTCAT	147	AUGAGGGA	CUGAUGAG	X	CGAA	ACAUAGAG	2656
558	TCTATGTT	T	CCCTCATG	148	CAUGAGGG	CUGAUGAG	X	CGAA	AACAUAAG	2657
559	CTATGTTT	C	CTCTATGT	149	ACAAGAGG	CUGAUGAG	X	CGAA	ACACAUAG	2658
563	GTTCCTCT	C	ATGTGTCT	150	AGCAACAU	CUGAUGAG	X	CGAA	AGGGAAAC	2659
568	CTCATGTG	T	CTGTGTCTA	151	UGUACAGC	CUGAUGAG	X	CGAA	ACAUAGAG	2660
574	GTGTCTGT	A	CAAAACCT	152	AGGUUUUG	CUGAUGAG	X	CGAA	ACAACAAC	2661
583	CAAAACCT	A	CGACCGGA	153	UCCUGCCG	CUGAUGAG	X	CGAA	AGGUUUUG	2662
604	GCACCTGT	T	TGCCATCT	154	GAUGGGAA	CUGAUGAG	X	CGAA	ACAGGUGC	2663
606	ACCTGTAT	T	CCATCCCC	155	GGGAGUGG	CUGAUGAG	X	CGAA	AUACAGGU	2664
607	CTGTATTT	C	CTACCCCA	156	UGGGAUGG	CUGAUGAG	X	CGAA	AUACAGAG	2665
612	ATTCCCAT	C	CCATCATC	157	GAUGAUGG	CUGAUGAG	X	CGAA	AUGGCAAU	2666
617	CATCCCAT	C	ATCTTGGG	158	CCCAAGAU	CUGAUGAG	X	CGAA	AUGGGAUG	2667
620	CCATCATC	C	TTGGGCTT	159	AAGCCCAA	CUGAUGAG	X	CGAA	AUGAUGGG	2668
622	CATCATCT	T	GGCTTTTC	160	GAAAGCCC	CUGAUGAG	X	CGAA	AGAUGAUG	2669
628	CTTGCGCT	T	TCGCAAAA	161	UUUUGCGA	CUGAUGAG	X	CGAA	AGCCCAAG	2670
629	TGCGGCTT	T	CGCAAAAT	162	AUUUUGCG	CUGAUGAG	X	CGAA	AAGCCCAA	2671
630	TGCGGCTT	C	GCACAAAT	163	UAUUUUGC	CUGAUGAG	X	CGAA	AAAGCCCA	2672
638	CGCAAAAT	A	CCATATGG	164	CCCAUAGG	CUGAUGAG	X	CGAA	AUUUUGCG	2673
642	AAATACCT	A	TGGGAGTG	165	CACUCCCA	CUGAUGAG	X	CGAA	AGGUUUUU	2674
656	GTGGGCTT	C	AGTCCGTT	166	AACGGACU	CUGAUGAG	X	CGAA	AGGCCCAC	2675
660	GCCTCACT	C	AGTTTCTC	167	GAGAAACG	CUGAUGAG	X	CGAA	ACUGAGGC	2676
664	CAGTCCGT	T	TCTCTTGG	168	CCAAGAGA	CUGAUGAG	X	CGAA	ACGGACUG	2677
665	AGTCCGTT	T	CTCTTGGC	169	GCCAAGAG	CUGAUGAG	X	CGAA	AACGAGCU	2678
666	GTCCGTTT	C	TCTTGGCT	170	AGCCAAAG	CUGAUGAG	X	CGAA	AAACGGAC	2679
668	CCGTTTCT	C	TGCGCTCA	171	UGAGCCAA	CUGAUGAG	X	CGAA	AGAAACGG	2680
670	GTTCCTCT	T	GGCTCACT	172	ACUGAGCC	CUGAUGAG	X	CGAA	AGAGAAAC	2681
675	TCTTGGCT	C	AGTTTACT	173	AGUAAACU	CUGAUGAG	X	CGAA	AGGCCAAG	2682
679	GGCTCACT	T	TCTATATG	174	CACUAGUA	CUGAUGAG	X	CGAA	AACGAGCC	2683
680	GGCTCACT	T	ACTATGTC	175	GCACUAGU	CUGAUGAG	X	CGAA	AACUGAGC	2684
681	CTCAGTTT	A	CTAGTGCC	176	GGCACUAG	CUGAUGAG	X	CGAA	AAACUGAG	2685
684	AGTTTACT	A	GTGCCATT	177	AAUGGCAC	CUGAUGAG	X	CGAA	AGUAAACU	2686
692	AGTGCCAT	T	TGTTCACT	178	ACUGAACCA	CUGAUGAG	X	CGAA	AUGGCACU	2687
693	GTGCCATT	T	GTTCATGG	179	CACUGAAG	CUGAUGAG	X	CGAA	AAUGGCAC	2688
696	CCATTGTT	T	CAGTGCTT	180	AACCAACG	CUGAUGAG	X	CGAA	ACAAAUUG	2689
697	CATTGTTT	A	CTAGTGTC	181	GAACCAAG	CUGAUGAG	X	CGAA	AACAAAUU	2690
704	TCAATGGT	T	CGTAGGCG	182	GCCUACUG	CUGAUGAG	X	CGAA	ACCACUGA	2691
705	CAGTGCTT	C	GTAGGGCT	183	AGCCUACG	CUGAUGAG	X	CGAA	AACCAACU	2692

Table 37

708	TGTTTCGT A GGGCTTTC	184	GAAAGCCC CUGAUGAG X CGAA ACGAACCA	2693
714	GTAGGGCT T TCCCCAC	185	GUGGGGGA CUGAUGAG X CGAA AGCCCUAC	2694
715	TAGGGCTT T CCCCACCT	186	AGUGGGGG CUGAUGAG X CGAA AAGCCCUA	2695
716	AGGGCTTT C CCCCACCT	187	CAGUGGGG CUGAUGAG X CGAA AAGCCCUU	2696
726	CCCACTGT C TGCTTTTC	188	GAAAGCCA CUGAUGAG X CGAA ACAGUGGG	2697
732	GTCTGGCT T TCACTTAT	189	AUAAACUGA CUGAUGAG X CGAA AGCCAGAC	2698
733	CTGTGGCT T CAGTTATA	190	UAUAACUG CUGAUGAG X CGAA AAGCCAGA	2699
734	CTGGCTTT C AGTTATAT	191	AUAUAACU CUGAUGAG X CGAA AAGGCCAG	2700
738	CTTTCAGT T ATATGGAT	192	AUCCAUAU CUGAUGAG X CGAA ACUGAAAG	2701
739	TTTCAGTT A TATGGATG	193	CAUCCAUA CUGAUGAG X CGAA AACUGAAA	2702
741	TCACTTAT A TGGATGAT	194	AUCAUCCA CUGAUGAG X CGAA AUACACGA	2703
755	GATGTGGT T TTGGGGGC	195	GGCCCCAA CUGAUGAG X CGAA ACCACAUC	2704
756	TGTGTGGT T TTGGGGGC	196	GGCCCCCA CUGAUGAG X CGAA AACCAU	2705
757	TGTGTGTT T GGGGGCCA	197	UGGCCCCC CUGAUGAG X CGAA AACCCACA	2706
769	GGCCAAGT T TCCCAAC	198	GUUGUACA CUGAUGAG X CGAA ACUUGGCC	2707
773	AAGTCTGT A CAACATCT	199	AGAUGUGU CUGAUGAG X CGAA ACACAGCU	2708
780	TACAACAT C TTGAGTCC	200	GGACUCAA CUGAUGAG X CGAA AAGUUGUA	2709
782	CAACATCT T GAGTCCCT	201	AGGGACUC CUGAUGAG X CGAA AGAUGUUG	2710
787	TCTTGAGT C CTTTATG	202	CAUAAAGG CUGAUGAG X CGAA ACUCACGA	2711
791	GAGTCCCT T TTCTTCGC	203	GGCGCAUA CUGAUGAG X CGAA AGGGACUC	2712
792	AGTCCCTT T ATGCGCTG	204	AGCGGCAU CUGAUGAG X CGAA AAGGGACU	2713
793	GTCCCTTT A TGCCCGTG	205	CAGCGGCA CUGAUGAG X CGAA AAGGGGAC	2714
803	GCGCTGTG T ACCAATTT	206	AAAUUGGU CUGAUGAG X CGAA ACAGCGGC	2715
804	CCGCTGTT A CCAATTTT	207	AAAAUUGG CUGAUGAG X CGAA AACACGGG	2716
810	TTACCAAT T TTCTTTTG	208	CAAAAGAA CUGAUGAG X CGAA AUUGGUAA	2717
811	TACCAAT T TCTTTTGT	209	ACAAAGAA CUGAUGAG X CGAA AAUUGGUA	2718
812	ACCAATTT T CTTTTGTG	210	GACAAAGG CUGAUGAG X CGAA AAUUGGUU	2719
813	CCAATTTT C TTTTGTCT	211	AGACAAAA CUGAUGAG X CGAA AAUUGGGG	2720
815	AAATTTCT T TTGTCTTT	212	AAAGACAA CUGAUGAG X CGAA AGAAAAUJ	2721
816	ATTTTCTT T TGCTTTTG	213	CAAAAGAA CUGAUGAG X CGAA AAGAAAAU	2722
817	TTTTCCTT T GTCTTTTG	214	CCAAAGAC CUGAUGAG X CGAA AAGAAAAA	2723
820	TCTTTTGT C TTTGGGTA	215	UACCCAAA CUGAUGAG X CGAA ACAAAAGA	2724
822	TTTGTCT T TGGGTATA	216	UAUACCCA CUGAUGAG X CGAA AGACAAAA	2725
823	TTGTGCTT T GGGTATAC	217	GUUAUACC CUGAUGAG X CGAA AAGACAAA	2726
828	CTTTGGGT A TCAATTTA	218	UAAUUGUA CUGAUGAG X CGAA ACCCAAAG	2727
830	TTGGGTAT A CATTTAAA	219	UUUAAUUG CUGAUGAG X CGAA AUACCCAA	2728
834	GTATACAT T TAAACCTT	220	AGGUUUUA CUGAUGAG X CGAA AUGUAUAC	2729
835	TATACATT T AAACCTTC	221	GAGGUUUU CUGAUGAG X CGAA AAUGUUAU	2730
836	ATACATTT A AACCTTCA	222	UGAGGGUU CUGAUGAG X CGAA AAUUGUAU	2731
843	TAAACCTT C ACATAACA	223	UGUUUUUU CUGAUGAG X CGAA AGGUUUUA	2732
865	ATGGGGAT A TTCCCTTA	224	UAAGGGAA CUGAUGAG X CGAA AUCCCAU	2733
867	GGGATAT T CCGTTAAC	225	GUUAAAGG CUGAUGAG X CGAA AAUACCCC	2734
868	GGATATT C CCTTAAT	226	AGUUAAAG CUGAUGAG X CGAA AAUUAUCC	2735
872	TATTCCTT T AACTTCA	227	AUGAAGUU CUGAUGAG X CGAA AGGGAUUA	2736
873	ATTCCCTT A ACTTCATG	228	CAUGAAGU CUGAUGAG X CGAA AAGGGAAU	2737
877	CCTTAAC T CATGGGAT	229	AUCCCAUG CUGAUGAG X CGAA AGUUAAGG	2738
878	CTTAAC T ATGGGATA	230	UAUCCCAU CUGAUGAG X CGAA AAGUUAAG	2739
886	CATGGGAT A TGTAAATT	231	CAAUUACA CUGAUGAG X CGAA AUCCCAU	2740
890	GGATATGT A ATTGGGAT	232	CUCCCAU CUGAUGAG X CGAA ACAUAUCC	2741
893	TATGTAAT T GGGAGTTG	233	CAACUCCC CUGAUGAG X CGAA AUUACAUA	2742
900	TTGGGAGT T GGGGCACA	234	UGUGCCCC CUGAUGAG X CGAA ACUCCCAA	2743

Table 3/

910	GGGCACAT	T	GCCACAGG	235	CCUGUGGC	CUGAUGAG	X	CGAA	AUGUGCCC	2744
924	AGGAACAT	A	TGTACAA	236	UUGUACAA	CUGAUGAG	X	CGAA	AUGUCCU	2745
926	GAACATAT	T	GTACAAAA	237	UUUUGUAC	CUGAUGAG	X	CGAA	AUAUUGUC	2746
929	CATATTGT	A	CAAAAAAT	238	AUUUUUUG	CUGAUGAG	X	CGAA	ACAAUUAUG	2747
938	CAAAAAAT	C	AAATGTGT	239	CACAUUUU	CUGAUGAG	X	CGAA	AUUUUUUG	2748
948	AAATGTGT	T	TTAGGAAA	240	UUUCCUAA	CUGAUGAG	X	CGAA	ACACAUUU	2749
949	AAATGTGT	T	TAGGAAAC	241	GUUUCCUA	CUGAUGAG	X	CGAA	AAACAUUU	2750
950	ATGTGTGT	T	AGGAAACT	242	AGUUUCCU	CUGAUGAG	X	CGAA	AAACCAU	2751
951	TGTGTGT	A	GGAAACTT	243	AAGUUUCC	CUGAUGAG	X	CGAA	AAACACA	2752
959	AGGAAACT	T	CCTGTAAA	244	UUUACAGG	CUGAUGAG	X	CGAA	AGUUUCCU	2753
960	GGAAACTT	C	CTGTAAAC	245	GUUUACAG	CUGAUGAG	X	CGAA	AAGUUUCC	2754
965	CTTCCTGT	A	AACAGGCC	246	GGCCUGUU	CUGAUGAG	X	CGAA	ACAGUAGC	2755
975	ACAGGCCT	A	TTGATTGG	247	CCTAACAA	CUGAUGAG	X	CGAA	AGGCCUGU	2756
977	AGGCCTAT	T	GATTGGAA	248	UUUCAAUC	CUGAUGAG	X	CGAA	AUAGCCCU	2757
981	CTATTGAT	T	GGAAAGTA	249	UACUUUCC	CUGAUGAG	X	CGAA	AUCAUAG	2758
989	TGGAAAGT	A	TGTCAACG	250	CGUUGACA	CUGAUGAG	X	CGAA	ACUUUCCA	2759
993	AAGTATGT	C	AACGAATT	251	AAUUCGUU	CUGAUGAG	X	CGAA	ACAUUCCA	2760
1001	CAACGAAT	T	GTGGTGCT	252	AGACCCAC	CUGAUGAG	X	CGAA	ATUCGUGJ	2761
1008	TTGTGGGT	C	TTTGTGGG	253	CCCCAAAA	CUGAUGAG	X	CGAA	ACCCACAA	2762
1010	GTGGGTCT	T	TTGGGGTT	254	AAACCCAA	CUGAUGAG	X	CGAA	AGACCCAC	2763
1011	TGGGTCTT	T	TGGGGTIT	255	AAACCCCA	CUGAUGAG	X	CGAA	AAGACCCA	2764
1012	GGGTCTTT	T	GGGGTTTG	256	CAAAACCC	CUGAUGAG	X	CGAA	ACAGACCC	2765
1018	TTTGGGGT	T	TGCGCCCC	257	GGCGCGCA	CUGAUGAG	X	CGAA	ACCCCAAA	2766
1019	TTGGGGTT	T	GCGGCCCC	258	GGGGCGCG	CUGAUGAG	X	CGAA	AACCCCAA	2767
1029	CGGCCCTT	T	TCACGCAA	259	UUGCGUGA	CUGAUGAG	X	CGAA	AGGGGCGG	2768
1030	CGGCCCTT	T	CACGCAAT	260	AUUGCGUG	CUGAUGAG	X	CGAA	AAGGGGCG	2769
1031	GCCCTTTT	C	ACGCAATG	261	CAUUGCGU	CUGAUGAG	X	CGAA	AAAGGGGC	2770
1045	ATGTGGAT	A	TTCTGCTT	262	AAGCAGAA	CUGAUGAG	X	CGAA	AUCCACAU	2771
1047	GTGGATAT	T	CTGCTTTA	263	UAAAGCAG	CUGAUGAG	X	CGAA	AUUUCCAC	2772
1048	TGGATATT	C	TGCTTTAA	264	UUAAAGCA	CUGAUGAG	X	CGAA	AAUUAUCC	2773
1053	ATTCTGCT	T	TAATGCCT	265	AGGCAUUA	CUGAUGAG	X	CGAA	AGCAGAAU	2774
1054	TTCTGCTT	T	AATGCCTT	266	AAGGCAUU	CUGAUGAG	X	CGAA	AAGCAGAA	2775
1055	TCGTCTTT	A	ATGCTCTT	267	AAAGGCAU	CUGAUGAG	X	CGAA	AAAGCAGA	2776
1062	TAATGCCT	T	TATATGCA	268	UGCAUUAU	CUGAUGAG	X	CGAA	AGGCAUUA	2777
1063	AATGCCTT	T	ATATGCAT	269	AUGCAUUA	CUGAUGAG	X	CGAA	AAGGCAUU	2778
1064	ATGCTCTT	A	TATGCATG	270	CAUGCAUA	CUGAUGAG	X	CGAA	AAAGGCAU	2779
1066	GCTTTTAT	A	TGCTATGA	271	UGCAUGCA	CUGAUGAG	X	CGAA	AUAAAGGC	2780
1076	GCATGCAT	A	CAAGCAAA	272	UUUGCUUG	CUGAUGAG	X	CGAA	AUGCAUCC	2781
1092	AACAGGCT	T	TTACTTTC	273	GAAAGUAA	CUGAUGAG	X	CGAA	AGCCUGUU	2782
1093	ACAGGCTT	T	TACTTTCT	274	AGAAAGUA	CUGAUGAG	X	CGAA	AAGCCUGU	2783
1094	CAGGCTTT	T	ACTTTCTC	275	GAGAAAGU	CUGAUGAG	X	CGAA	AAAGCCUG	2784
1095	AGGCTTTT	A	CTTTCTCG	276	CGAGAAAG	CUGAUGAG	X	CGAA	AUAAAGCU	2785
1098	CTTTTACT	T	TCTGCCCC	277	UGGCGAGA	CUGAUGAG	X	CGAA	AGUAAAGG	2786
1099	TTTTACTT	T	CTCGCCAA	278	UUGGCGAG	CUGAUGAG	X	CGAA	AGUAAAGG	2787
1100	TTTACTTT	C	TGCGCAAC	279	GUUGGCGA	CUGAUGAG	X	CGAA	AAAGUAAA	2788
1102	TACTTTCT	C	GCCAACTT	280	AAGUUGGC	CUGAUGAG	X	CGAA	AGAAAGUA	2789
1110	GCCCAACT	A	ACAAAGCC	281	GGCCUUGU	CUGAUGAG	X	CGAA	AGUUGGCG	2790
1111	GCCCAACT	A	CAAGGCCT	282	AGGCCUUG	CUGAUGAG	X	CGAA	AAGUUGGC	2791
1120	CAAGGCCT	T	TCTAAGTA	283	UACUJAGA	CUGAUGAG	X	CGAA	AGGCCUUG	2792
1121	AAAGGCCT	T	CTAAGTAA	284	UUACUJAG	CUGAUGAG	X	CGAA	AAAGCCUU	2793
1122	AGGCCTTT	C	TAAGTAAA	285	UUUACUUA	CUGAUGAG	X	CGAA	AAAGCCUU	2794

Table 37

1124	GCCTTTCT A AGTAAACA	286	UGUUUACU CUGAUGAG X CGAA AGAAAGGC	2795
1128	TTCTAAGT A AACAGTAT	287	AUACUGUU CUGAUGAG X CGAA ACUUAAGA	2796
1135	TAAACAGT A TOTGAACC	288	GGUUCACA CUGAUGAG X CGAA ACUGUUUA	2797
1145	GTGAACCT T TACCCCGT	289	ACGGGGUA CUGAUGAG X CGAA AGUUUAC	2798
1146	TGAACCTT T ACCCGGTT	290	AACGGGGU CUGAUGAG X CGAA AAGGUUCA	2799
1147	GAACCTTT A CCCCGTTG	291	CAACGGGG CUGAUGAG X CGAA AAAGGUUC	2800
1154	TACCCCGT T GCTGCGCA	292	UGCCGAGC CUGAUGAG X CGAA ACGGGUUA	2801
1158	CCGTGTCT C GGCACAGG	293	CCGUUGCC CUGAUGAG X CGAA AGCAACGG	2802
1173	GGCTGGT C TATGCCAA	294	UUGGCAUA CUGAUGAG X CGAA ACCAGGCC	2803
1175	CCTGGTCT A TGCCAACT	295	ACUUGGCA CUGAUGAG X CGAA AGACCAAG	2804
1186	CCAAGTGT T TGCTGAGC	296	CGUCAGCA CUGAUGAG X CGAA ACACUUGG	2805
1187	CAAGTGTT T GCTGACGC	297	GGGUCAGC CUGAUGAG X CGAA AACACUUG	2806
1209	CCACTGGT T GGGGCTTG	298	CAAGCCCC CUGAUGAG X CGAA ACCAGUUG	2807
1216	TTGGGGCT T GGCATATG	299	CUAUGGCC CUGAUGAG X CGAA AGCCCCAA	2808
1223	TTGGCCAT A GGCATCA	300	UGAUGGCC CUGAUGAG X CGAA AUGGCCAA	2809
1230	TAGGCCAT C AGGCCATG	301	CAUGGCGU CUGAUGAG X CGAA AUGGCCUA	2810
1249	TGGAACCT T GTGTCTCT	302	GAGACACA CUGAUGAG X CGAA AGUUUCCA	2811
1250	GGAACTTT T GTGTCTCT	303	GGAGACAC CUGAUGAG X CGAA AAGGUUCC	2812
1255	CTTTGTGT C TCTCTCTG	304	GCAGAGGA CUGAUGAG X CGAA ACACAAAG	2813
1257	TTGTGTCT A CCCTCGCG	305	CGGCAGAG CUGAUGAG X CGAA AGACACAA	2814
1260	TGTCTCTC C TGCCGATC	306	GAUCGGCA CUGAUGAG X CGAA AGGAGACA	2815
1268	CTGCCCAT C CTTCCGCG	307	GGGUAUG CUGAUGAG X CGAA AUCCGCG	2816
1272	CGATCCAT A CCGCGGAA	308	UUCGCGGG CUGAUGAG X CGAA AUGGAGCG	2817
1283	GGGAAACT C CTAGCCCG	309	GGCGGCUG CUGAUGAG X CGAA AGUUUCCG	2818
1286	GAACCTCT A GCGCTCTG	310	CAAGCGG CUGAUGAG X CGAA AGGAGUUC	2819
1293	TAGCCGCT T GTTTGTGT	311	AGCAAAAC CUGAUGAG X CGAA AGCGGCUA	2820
1296	CCGCTTGT T TTGCTCGC	312	GGGAGCAA CUGAUGAG X CGAA AGCAAGCG	2821
1297	CGCTTGTT T TGCTGCA	313	UGCGAGCA CUGAUGAG X CGAA AACAGCGC	2822
1298	GCTTGTTT T GCTCGCAG	314	CUGCGAGC CUGAUGAG X CGAA AACAGAGC	2823
1302	GTTTTGCT C GCAGCAGG	315	CCUGCUGC CUGAUGAG X CGAA AGCAAAAC	2824
1312	CAGCAGGT C TGGGGCAA	316	UUGCCCCA CUGAUGAG X CGAA ACCUUCUG	2825
1325	GCAAAACT C CTTCCGAC	317	GUCCCGAU CUGAUGAG X CGAA AGUUUUGC	2826
1328	AAACTCAT C GGGACTGA	318	UCAGUCCC CUGAUGAG X CGAA AUGAGUUU	2827
1341	CTGACAAAT T CTGCTGTC	319	CACGACAG CUGAUGAG X CGAA AUUUGUCAG	2828
1342	TGACAAAT C TGTCTGTC	320	GCACGACA CUGAUGAG X CGAA AAUUGUCA	2829
1346	AATTCTGT C GTGCTCTC	321	GAGAGCAC CUGAUGAG X CGAA ACAGAAUU	2830
1352	GTGCTGCT C TCCCGCAA	322	UUGCGGGA CUGAUGAG X CGAA AGCAGCAC	2831
1354	CGTCTCT C CCGCAAT	323	AUUUGCGG CUGAUGAG X CGAA AGAGCAGC	2832
1363	CCGCAAT A TACATCAT	324	AUGAUGUA CUGAUGAG X CGAA AUUUGCGG	2833
1365	GCAAAAT A GCTGCTTT	325	AAUUGAUG CUGAUGAG X CGAA AAUUGUUC	2834
1369	ATATACAT C ATTTCAT	326	AUGGAAAU CUGAUGAG X CGAA AUGUAUUA	2835
1372	TACATCAT T TCCATGGC	327	GCCAUGGA CUGAUGAG X CGAA AUGAUGUA	2836
1373	ACATCAT T CATGGCT	328	AGCCAUGG CUGAUGAG X CGAA AAUUGAUG	2837
1374	CATCATTT C CATGGCTG	329	CAGCCAUG CUGAUGAG X CGAA AAUUGAUG	2838
1385	TGCTGTCT A GGCTGTGC	330	GCACAGCC CUGAUGAG X CGAA AGCAGCCA	2839
1406	AACTGGAT C CTACCGGC	331	CCGCGUAG CUGAUGAG X CGAA AUCCAGUU	2840
1409	TGATCTCT A CCGGGGAC	332	GUCCCGGG CUGAUGAG X CGAA AGGAUCCA	2841
1420	CGGAGCGT C TTGTTT	333	AAACAAAG CUGAUGAG X CGAA ACCGUCCC	2842
1423	GACGTCTT T TGTTCAGC	334	CGUAAAAC CUGAUGAG X CGAA AGGACGUC	2843
1424	ACGTCTCT T GTTTCAGT	335	ACGUAAAC CUGAUGAG X CGAA AAGGACGU	2844
1427	TCCTTTGT T TACGTGCC	336	GGGACGUA CUGAUGAG X CGAA ACACAAAG	2845

Table 37

1428	CTTTTGT T ACGTCCCG	337	CGGGACGU CUGAUGAG X CGAA AACAAAGG	2846
1429	CTTTTGT T A CGTCCCGT	338	ACGGGACG CUGAUGAG X CGAA AAACAAGG	2847
1433	GTTTACGT C CGCTCGGC	339	GCGGACGG CUGAUGAG X CGAA ACGUAAAC	2848
1438	CGTCCGT C GCGCTGGA	340	UCAGCGCC CUGAUGAG X CGAA ACGGGACG	2849
1449	CGCTGAAT C CCGCGGAC	341	GUCGCGCG CUGAUGAG X CGAA AUUCAGCG	2850
1465	CGACCCCT C CCGGGGCC	342	GGCCCGCG CUGAUGAG X CGAA AGGGGUCG	2851
1477	CGGCGCT T GGGGCTCT	343	AGAGCCCG CUGAUGAG X CGAA AGCGGCCG	2852
1484	TGGGGCT C TACCGCCC	344	GGGCGGUA CUGAUGAG X CGAA AGCCCCAA	2853
1486	GGGGCTCT A CCGCCCGC	345	GCGGGCGG CUGAUGAG X CGAA AGAGCCCG	2854
1496	GCGCGCT T CTCGCGCT	346	AGGCGGAG CUGAUGAG X CGAA AGCGGGCG	2855
1497	GCGCGCT T CTCGCGCT	347	UAGCGGGA CUGAUGAG X CGAA AAGCGGGC	2856
1499	CGCGTCT C CGCTTATT	348	AAUAGGCG CUGAUGAG X CGAA AGAAGCGG	2857
1505	CTCGCGCT A TTGTACCG	349	CGGUACAA CUGAUGAG X CGAA AGCGGGAG	2858
1507	CGCGCTAT T GTACCGAC	350	GUCGGUAC CUGAUGAG X CGAA AUAGCGCG	2859
1510	CTATTGTT T CACCGCGT	351	ACGGUCGU CUGAUGAG X CGAA AAGCAAGG	2860
1519	CGGACCGT C CACGGGCG	352	GCGCCGUG CUGAUGAG X CGAA ACGGUCGG	2861
1534	GCGCACCT C TCTTTACG	353	CGUAAAGA CUGAUGAG X CGAA AGUGGCGC	2862
1536	GCACCTCT C TTTACCGG	354	CGCGUAAA CUGAUGAG X CGAA AGAGGUGC	2863
1538	ACCTCTCT T TACGCGGA	355	UCCGCGUA CUGAUGAG X CGAA AGAGAGGU	2864
1539	CTCTCTCT T CACCGGAC	356	GUCGCGGU CUGAUGAG X CGAA AAGAGAGG	2865
1540	CTCTCTCT A CCGGCGAT	357	AGUCGCGG CUGAUGAG X CGAA AAGAGAGG	2866
1549	CGGCGACT C CGGCTCTG	358	CAGACGGG CUGAUGAG X CGAA AGUCGCGG	2867
1555	CTCCCGCT C TCGGCTTT	359	AAGGCACA CUGAUGAG X CGAA ACGGGGAG	2868
1563	CTGTGCTT T CTCTCTCG	360	CAGAUAGG CUGAUGAG X CGAA AGGCACAG	2869
1564	TGTGCTCT C CTATCTCG	361	GCAGAUAG CUGAUGAG X CGAA AAGGCACA	2870
1566	TGCTCTCT C ATCTGCGG	362	CGGCGAGU CUGAUGAG X CGAA AAGAGGCA	2871
1569	CTTCTCAT C TGCGGACG	363	GUCGCGGA CUGAUGAG X CGAA AGGAGGAG	2872
1588	TGTGCACT T CGCTTTCAC	364	GUGAAGCG CUGAUGAG X CGAA AGGACACA	2873
1589	GTGCACTT C GCTTCACC	365	GGUGAAGC CUGAUGAG X CGAA AAGGACAC	2874
1593	ACTTCTCT T CACTCTCG	366	CAGAGGUG CUGAUGAG X CGAA AGCGAAGU	2875
1594	CTTCTCTT C ACTCTCTG	367	GCAGAGGU CUGAUGAG X CGAA AAGCGAAG	2876
1599	CTTCACTT C TGCACTGC	368	GACGUGCA CUGAUGAG X CGAA AGGUGAAG	2877
1607	CTGCACTT C GCATGGAG	369	CUCCAUGC CUGAUGAG X CGAA AGGUGCAG	2878
1651	CCCAAGGT C TTGCATAA	370	UUUAGCAA CUGAUGAG X CGAA ACCUUGGG	2879
1653	CAAGGTCT T CAGAAGAA	371	UUUUAUGC CUGAUGAG X CGAA AAGCUUUG	2880
1658	TCTTGCAAT A AGAGGACT	372	AGUCCUCU CUGAUGAG X CGAA AUGCAAGA	2881
1667	AGAGGACT C TTGACTTT	373	AAGUCCAA CUGAUGAG X CGAA AGUCCUCU	2882
1669	AGGACTCT T GGACTTTC	374	GAAAGUCC CUGAUGAG X CGAA AGAGUCCU	2883
1675	CTGGAAT T TCAGCAAT	375	AUUGCUGA CUGAUGAG X CGAA AGUCCAAG	2884
1676	TGGAAGCTT T CAGCAATG	376	CAUUGCUG CUGAUGAG X CGAA AAGUCCAA	2885
1677	TGGAAGCTT C AGCAATGT	377	ACAUUGCU CUGAUGAG X CGAA AAGUCCAA	2886
1686	AGCAATGT C AAGGACCG	378	CGGCGGUU CUGAUGAG X CGAA ACAUUGCU	2887
1699	ACCGACCT T GAGGACATA	379	UAUUGCTC CUGAUGAG X CGAA AGGUCGGU	2888
1707	TGAGGCAAT A CTTCAGAG	380	CUUUGAAG CUGAUGAG X CGAA AUGGCCUA	2889
1710	GGCATACT T CAAAGACT	381	AGUCUUUG CUGAUGAG X CGAA AGUAGGCC	2890
1711	GCATACTT C AAGAGCTG	382	CAGUCUUU CUGAUGAG X CGAA AAGUAGGC	2891
1725	CTGTGTGT T TAATGAGT	383	ACUCAUUA CUGAUGAG X CGAA ACAACACG	2892
1726	TGTGTGTT T AATGAGTG	384	CACUCAUU CUGAUGAG X CGAA AACACACA	2893
1727	TGTGTGTT A ATGAGTGG	385	CCACUCAU CUGAUGAG X CGAA AACACACG	2894
1743	GGAGGAGT T GGGGGAGG	386	CCUCCGCC CUGAUGAG X CGAA ACUCCUCC	2895
1756	GAAGAGGT T AGGTTAAA	387	UUUUAACU CUGAUGAG X CGAA ACCUCCUC	2896

Table 37

1757	AGGAGGTT A GGTAAAG	388	CUUUAACC CUGAUGAG X CGAA AACCUCCU	2897
1761	GGTAGGT T AAAGGTCT	389	AGACCUUU CUGAUGAG X CGAA ACCUAAAC	2898
1762	GTTAGGTT A AAGGTCTT	390	AAGACCUU CUGAUGAG X CGAA AACCUAAC	2899
1768	TAAAGGT C TTTGTACT	391	AGUACAAA CUGAUGAG X CGAA ACCUUUAA	2900
1770	AAAGGTCT T TGTACTAG	392	CUAGUACA CUGAUGAG X CGAA AGACCUUU	2901
1771	AAGGTCTT T GTACTAGG	393	CCUAGUAC CUGAUGAG X CGAA AAGACCUU	2902
1774	GTCCTTGT A CTAGGAGG	394	CCUCCUAG CUGAUGAG X CGAA ACAAGAC	2903
1777	TTTGTACT A GGAGGCTG	395	CAGCCUCC CUGAUGAG X CGAA AGUACAAA	2904
1787	GAGGCTGT A GGCATAAA	396	UUUAUGCC CUGAUGAG X CGAA ACAGCCUC	2905
1793	GTAGGCAT A AATTGGTG	397	CACCAUUU CUGAUGAG X CGAA AUGCCUAC	2906
1797	GCATAAAT T GGTGTGTT	398	AACACACC CUGAUGAG X CGAA AUUUUUGC	2907
1805	TGGTGTGT T CACGAGCA	399	UGCUGUG CUGAUGAG X CGAA ACACACCA	2908
1806	GGTGTGTT C ACCAGCAC	400	GUGCUGGU CUGAUGAG X CGAA AACACACC	2909
1824	ATGCAACT T TTTACCTT	401	AGGUGAAA CUGAUGAG X CGAA AGUUGCAU	2910
1825	TGCAACTT A TTTACCTC	402	GAGGUGAA CUGAUGAG X CGAA AAGUUGCA	2911
1826	GCACCTTT T TCACCTCT	403	AGAGGUGA CUGAUGAG X CGAA AAGUUGCC	2912
1827	CAACTTTT T CACCTCTG	404	CAGAGGUG CUGAUGAG X CGAA AAGUUGU	2913
1828	AACCTTTT C ACCTCTGC	405	GCAGAGGU CUGAUGAG X CGAA AAAAGUUG	2914
1833	TTTACCTT C ACCTTAAT	406	AUUAGGCA CUGAUGAG X CGAA AGGUGAAA	2915
1839	CTCTGCCT A TGCTCTCT	407	GAGAUGAU CUGAUGAG X CGAA AGGCAGAG	2916
1842	TGCTTAAT C ATCTCATG	408	CAUGAGAU CUGAUGAG X CGAA AUUAGGCA	2917
1845	CTAATCAT T CTCTGTTT	409	GAACAUGA CUGAUGAG X CGAA AUUAGUAG	2918
1847	AATCATCT C ATGTTCAT	410	AUGAACAU CUGAUGAG X CGAA AGAUGAUU	2919
1852	TCTCATGT T CATGTCCT	411	AGGACAUG CUGAUGAG X CGAA ACAUGAGA	2920
1853	CTCATGTT C ATGCTCTA	412	UAGGACAU CUGAUGAG X CGAA AACAUGAG	2921
1858	GTTCATGT C CTACTGTT	413	AACAGUAG CUGAUGAG X CGAA ACAUGAAC	2922
1861	CATGTCTT A CTGTTCAA	414	UUGACACG CUGAUGAG X CGAA AGACAUUG	2923
1866	CTACTGCT T CAAGCCTC	415	GAGGCUUG CUGAUGAG X CGAA ACAGUAGG	2924
1867	CTACTGTT C AAGCCTCC	416	GGAGGCUU CUGAUGAG X CGAA AACAGUAG	2925
1874	TCAAGCCT C CAAGCTGT	417	ACAGCUUG CUGAUGAG X CGAA AGGCUUGA	2926
1887	CTGTGCTT T GGGTGGCT	418	AGCCACCC CUGAUGAG X CGAA AGGCACAG	2927
1896	GCGTGGCT T TGGGGCAT	419	AUGCCCCA CUGAUGAG X CGAA AGCCACCC	2928
1897	GCTGGCTT T GGGGCATG	420	CAUGCCCC CUGAUGAG X CGAA AAGCCACC	2929
1911	ATGGACAT T GACCCGTA	421	UACGGGUC CUGAUGAG X CGAA AUUUCCAU	2930
1919	TGACCCGT A TAAAGAAT	422	AUUCUUUA CUGAUGAG X CGAA ACUGGUCA	2931
1921	ACCCGAT A AAGAATTT	423	AAAUUUUU CUGAUGAG X CGAA AUACGGGU	2932
1928	TAAAGAAT T TGGAGCTT	424	AAGCUCCA CUGAUGAG X CGAA AUUUCUUA	2933
1929	AAAGAATT T GGAGCTTC	425	GAAGCUCC CUGAUGAG X CGAA AUUUCUUU	2934
1936	TGGAGCT T CTGTGGAG	426	CUCCACAG CUGAUGAG X CGAA AGCUCCAA	2935
1937	TGGAGCTT C TGTGAGAT	427	ACUCCACA CUGAUGAG X CGAA AGCUCCAA	2936
1946	TGTGAGAT T ACTCTCTT	428	AAGAGAGU CUGAUGAG X CGAA ACUCCACA	2937
1947	TGTGAGAT A CTCTCTTT	429	AAAGAGAG CUGAUGAG X CGAA AACUCCAC	2938
1950	GAGTTACT C TCTTTTTT	430	AAAAAAGA CUGAUGAG X CGAA AGUAACTC	2939
1952	GTTACTCT C TTTTTTGC	431	GCAAAAAA CUGAUGAG X CGAA AGAGUJAC	2940
1954	TACTCTCT T TTTTGGCT	432	AGGCAAAA CUGAUGAG X CGAA AGAGAGUA	2941
1955	ACTCTCTT T TTTGCTTT	433	AAGGCAAA CUGAUGAG X CGAA AAGAGAGU	2942
1956	CTCTCTTT T TTGCTTTC	434	GAAGGCAA CUGAUGAG X CGAA AAAAGAGAG	2943
1957	TCTCTTTT T TGCCTTCT	435	AGAAGGCA CUGAUGAG X CGAA AAAAGAGA	2944
1958	CTCTTTTT T GCCTTCTG	436	CGAAGGCG CUGAUGAG X CGAA AAAAGAGG	2945
1963	TTTTGCTT T CTGACTTC	437	GAAGUCAG CUGAUGAG X CGAA AGGCAAAA	2946
1964	TTTTGCTT C TGACTTCT	438	AGAAGUCA CUGAUGAG X CGAA AAGGCAAA	2947

Table 37

1970	TTCTGACT T CTTTCTT	439	AAGGAAAG CUGAUGAG X CGAA AGUCAGAA	2948
1971	TCGACTT C TTTCTTC	440	GAAGGAAA CUGAUGAG X CGAA AGUCAGAA	2949
1973	TGACTTCT T CTTCTTA	441	UAGAAGGA CUGAUGAG X CGAA AGAAGUCA	2950
1974	GACTTCTT T CTTCTAT	442	AUAGAAGG CUGAUGAG X CGAA AGAAGUC	2951
1975	ACTTCTTT C CTTCTATT	443	AAUAGAAG CUGAUGAG X CGAA AAAGAAGU	2952
1978	TCCTTCTT C CTATTGGA	444	UCGAUAG CUGAUGAG X CGAA AGGAAGA	2953
1979	CTTCTCTT C TATTGAG	445	CUCGAUA CUGAUGAG X CGAA AGGAAGA	2954
1981	TTCTTCTT A TTTGAGAT	446	AUCUCGA CUGAUGAG X CGAA AGAAGGAA	2955
1983	CCTTCTAT T CGAGATCT	447	AGAUUCG CUGAUGAG X CGAA AAUAGAAG	2956
1984	CTTCTATT C GAGATCTC	448	GAGAUUC CUGAUGAG X CGAA AAUAGAAG	2957
1990	TTGAGAT C TCTCGAC	449	GUCGAGGA CUGAUGAG X CGAA AUUCUGAA	2958
1992	CGAGATCT C TTTGACAC	450	GUGGAGG CUGAUGAG X CGAA AGAUCUGG	2959
1995	GATCTCTT C GACACCG	451	GCGGUGC CUGAUGAG X CGAA AGGAGAU	2960
2006	CACCGCT C TGCTCTGT	452	ACAGACA CUGAUGAG X CGAA AGCGGUG	2961
2011	CCTCTGCT C TGATCGG	453	CCGAUACA CUGAUGAG X CGAA AGCAGAGG	2962
2015	TGCTCTGT A TGGGGGG	454	CCCCCGA CUGAUGAG X CGAA ACAGAGCA	2963
2017	CTCTGTAT C GGGGGGG	455	GGCCCCC CUGAUGAG X CGAA AUACAGAG	2964
2027	GGGGGCTT T AGATCTC	456	GAGATCTU CUGAUGAG X CGAA AGGCCCC	2965
2028	GGGGGCTT A GATCTCC	457	GGAGACU CUGAUGAG X CGAA AAGGCCCC	2966
2033	CTTAGAGT C TCGGGAAC	458	GUUCCGA CUGAUGAG X CGAA ACUCUAG	2967
2035	TAGAGTCT C CGGACAT	459	AUGUCCG CUGAUGAG X CGAA AGACUCUA	2968
2044	CGAGACAT C TTTCACCT	460	AGGUGAC CUGAUGAG X CGAA AUAGUCCG	2969
2047	AACATTGT T CACCTCAC	461	GUGAGGUG CUGAUGAG X CGAA ACAUAGU	2970
2048	ACATTGTT C ACCTCAC	462	GUUGAGU CUGAUGAG X CGAA AACAUAGU	2971
2053	GTTACCTT C ACCATAG	463	CGUAUGU CUGAUGAG X CGAA AGGUGAAC	2972
2059	CTACCAT C CGGACCT	464	GAGUCCG CUGAUGAG X CGAA AUGUGAG	2973
2067	ACGGACCT C AGGCAAG	465	GCUUGCU CUGAUGAG X CGAA AGUGCCG	2974
2077	GCCAGCT A TTTGTGT	466	ACACAGAA CUGAUGAG X CGAA AGUUGCC	2975
2079	CAGCTAT T CTGTGTT	467	CAACACAG CUGAUGAG X CGAA AUAGCUU	2976
2080	AAGCTATT C TGTGTGG	468	CCAACACA CUGAUGAG X CGAA AAUAGCUU	2977
2086	TTCTGTGT T GGGGTAG	469	CUCACCCC CUGAUGAG X CGAA ACACAGAA	2978
2096	GGGTGAGT T GATGAAT	470	GAUUAUC CUGAUGAG X CGAA ACUACACC	2979
2104	TGATGAAT C TAGCAC	471	GGUGGCUA CUGAUGAG X CGAA AUUAUCA	2980
2106	ATGAATCT A GCCACCT	472	CAGGUGG CUGAUGAG X CGAA AGAUUAU	2981
2125	TGGGAAGT A ATTGGAA	473	UUCCAAU CUGAUGAG X CGAA ACUUCCA	2982
2128	GAGTAAT T TGAAGAT	474	AUUCUUA CUGAUGAG X CGAA AUUACUUC	2983
2129	AAGTAATT T GGAAGATC	475	GAUCUCC CUGAUGAG X CGAA AAUUAUUC	2984
2137	TGGAAGT C CAGCATC	476	GGAUGUG CUGAUGAG X CGAA AUUCUCCA	2985
2144	TCCAGCAT C CAGGGAAT	477	AUUCUCC CUGAUGAG X CGAA AUUCUCCG	2986
2153	CAGGGAAT T AGTAGTCA	478	UGACUACU CUGAUGAG X CGAA AUUCUCCG	2987
2154	AGGGAATT A GTAGTCA	479	CUGACUAC CUGAUGAG X CGAA AUUUCUCC	2988
2157	GAATTAGT A GTACAGTA	480	UAGCUGAC CUGAUGAG X CGAA ACUAUUC	2989
2160	TTAGTAGT C AGCTATGT	481	ACAUAGCU CUGAUGAG X CGAA ACUACUA	2990
2165	AGTCAGCT A TGTCAAC	482	CGUUGACA CUGAUGAG X CGAA AGCUGACU	2991
2169	AGCTATGT C AAGCTTAA	483	UUAACGUU CUGAUGAG X CGAA ACAUAGCU	2992
2175	GTCACGTT T AATATGG	484	CCCAUAU CUGAUGAG X CGAA ACGUUGAC	2993
2176	TCAACGTT A ATATGGG	485	GCCCAUAU CUGAUGAG X CGAA ACGUUGA	2994
2179	ACGTTAAT A TGGGCTA	486	UAGGCCCA CUGAUGAG X CGAA AUUAACGU	2995
2187	ATGGGCTT A AAAATCAG	487	CUGAUUUU CUGAUGAG X CGAA AGGCCCAU	2996
2193	CTAAAAAT C AGACAACT	488	AGUUGUCU CUGAUGAG X CGAA AUUUUUAG	2997
2202	AGACAAT A TTGTGTT	489	AACCAACA CUGAUGAG X CGAA AGUUGUCU	2998

Table 37

2204	ACAACAT T	GTGGTTTC	490	GAAACCAC	CUGAUGAG	X	CGAA	AUAGUUGU	2999
2210	ATTGTGGT T	TCACATTT	491	AAUUGUGA	CUGAUGAG	X	CGAA	ACCACAAU	3000
2211	TTGTGGTT T	CACATTTT	492	GAAUUGUG	CUGAUGAG	X	CGAA	AACCACAA	3001
2212	TTGTGGTTT C	ACATTTCC	493	GGAAUUGU	CUGAUGAG	X	CGAA	AAACCACA	3002
2217	TTTCACAT T	TCCTGTCT	494	AGACAGGA	CUGAUGAG	X	CGAA	AUGUGAAA	3003
2218	TTACACAT T	CCTGTCTT	495	AAGACAGG	CUGAUGAG	X	CGAA	AAUGUGAA	3004
2219	TCACATTT C	CTGTCTTA	496	UAAGACAG	CUGAUGAG	X	CGAA	AAUUGUGA	3005
2224	TTTCCTGT C	TTACTTTT	497	AAAAGUAA	CUGAUGAG	X	CGAA	ACAGGAAA	3006
2226	TCCTGTCT C	ACTTTTGG	498	CCAAAAGU	CUGAUGAG	X	CGAA	AGACAGGA	3007
2227	CCTGTCTT A	CTTTTGGG	499	CCCAAAGG	CUGAUGAG	X	CGAA	AAGACAGG	3008
2230	GTCTTACT T	TTGGCGGA	500	UCGCCCAA	CUGAUGAG	X	CGAA	AGUAAGAC	3009
2231	TCTTACTT T	TGGGCGAG	501	CUCGCCCA	CUGAUGAG	X	CGAA	AAGUAAGA	3010
2232	CTTACTTT T	GGCGGAGA	502	UCUCGCCC	CUGAUGAG	X	CGAA	AAAGUAGA	3011
2247	GAAACTGT T	CTTGAATA	503	UAUUCAAG	CUGAUGAG	X	CGAA	ACAGUUUC	3012
2248	AAACTGTT C	TTGAATAT	504	AUAUUCAA	CUGAUGAG	X	CGAA	AACAGUUU	3013
2250	ACTGTTCT T	GAATATTT	505	AAAUUUCU	CUGAUGAG	X	CGAA	AGAACAGU	3014
2255	TCTTGAAT A	TTTGTGTT	506	ACACCAAA	CUGAUGAG	X	CGAA	AUUCAGAA	3015
2257	TTGAATAT T	TGTGTGCT	507	AGACACCA	CUGAUGAG	X	CGAA	AUAUUCAA	3016
2258	TGAATATT T	TGTGTCTT	508	AAGACACC	CUGAUGAG	X	CGAA	AUAUUCUA	3017
2264	TTTGTGTT C	TTTTGGAG	509	CUCCAAA	CUGAUGAG	X	CGAA	ACACCAAA	3018
2266	TGTTGTCT T	TTGAGGTG	510	CACUCCAA	CUGAUGAG	X	CGAA	AGACACCA	3019
2267	GGTGTCTT T	TGGAGGTG	511	ACACUCCA	CUGAUGAG	X	CGAA	AAGACACC	3020
2268	GTGTCTTT T	GGAGTGTG	512	CACACUCC	CUGAUGAG	X	CGAA	AAAGACAC	3021
2280	GTGTGGAT T	CCACTCTC	513	GGAGUGGC	CUGAUGAG	X	CGAA	AUCCACAC	3022
2281	TGTGTGAT T	GCCTCTCT	514	AGGAGUGC	CUGAUGAG	X	CGAA	AAUCCACA	3023
2287	TTGCACT C	CTCCTGCA	515	UGCAGGAG	CUGAUGAG	X	CGAA	AGUCCGAA	3024
2290	GCCTCTCT C	CTGATAT	516	AUAUGCAG	CUGAUGAG	X	CGAA	AGGAGUGC	3025
2297	TCCTGCAT A	TAGACCAC	517	GUGGUCCA	CUGAUGAG	X	CGAA	AUGCAGGA	3026
2299	CTGCATAT A	GACACCA	518	UGGUGUCC	CUGAUGAG	X	CGAA	AUAUGCAG	3027
2317	ATGCCCT A	TCTTATCA	519	UGAUAAGA	CUGAUGAG	X	CGAA	AAGGCAU	3028
2319	GCCCTAT C	TTATCAAC	520	GUGUAUAA	CUGAUGAG	X	CGAA	AUAAGGCA	3029
2321	CCCTATCT T	ATCAACAC	521	GUGUUGAU	CUGAUGAG	X	CGAA	AUAAGGCG	3030
2322	CCTATCTT A	TCAACACT	522	AGUGUUGA	CUGAUGAG	X	CGAA	AAGAUAGG	3031
2324	TATCTTAT C	AACACTTC	523	GAAGUUGU	CUGAUGAG	X	CGAA	AUAAGAUU	3032
2331	TCAACACT C	CGGAAAC	524	GUUUCGGG	CUGAUGAG	X	CGAA	AGUUGUUA	3033
2332	CAACACTT C	CGGAAACT	525	AGUUCGGG	CUGAUGAG	X	CGAA	AAGUUGU	3034
2341	CGGAAACT A	CTGTTGTT	526	AACAACAG	CUGAUGAG	X	CGAA	AGUUCGGG	3035
2346	ACTACTGT T	GTATGACG	527	CGUUAUAC	CUGAUGAG	X	CGAA	ACAGUAGU	3036
2349	ACTGTTGT T	AGACGAAG	528	CUCUGUCU	CUGAUGAG	X	CGAA	ACCAAGAU	3037
2350	CTGTTGTT A	GACGAAGA	529	UCUUCGUC	CUGAUGAG	X	CGAA	AACAACAG	3038
2366	AGGCAAGT C	CCCTAGAA	530	UUCUAGGG	CUGAUGAG	X	CGAA	ACUUGCCU	3039
2371	GGTGCCT C	GAAGAGA	531	UCUUCUUC	CUGAUGAG	X	CGAA	AGGGGACC	3040
2383	GAAGAACT C	CCCTGCCT	532	AGGCGAGG	CUGAUGAG	X	CGAA	AGUUCUUC	3041
2387	AACCTCCT C	GCCTCGCA	533	UGCGAGGC	CUGAUGAG	X	CGAA	AGGAGAUU	3042
2392	CCTCGCCT C	GCAGACGA	534	UCGUCUGC	CUGAUGAG	X	CGAA	AGGCGAGG	3043
2405	ACGAAGGT C	TCAATCCG	535	GGCAUUGA	CUGAUGAG	X	CGAA	ACUUCGCU	3044
2407	GAAGGTCT C	AATCGCCG	536	CGCGGAU	CUGAUGAG	X	CGAA	AGACUUCU	3045
2411	GTCTCAAT C	CGCGCTTC	537	GACGCGGC	CUGAUGAG	X	CGAA	ATUGAGAC	3046
2419	CGCCGGGT C	GCAGAGA	538	UCUUCUGC	CUGAUGAG	X	CGAA	ACGCGGCG	3047
2429	CAGAAGAT C	TCAATCTC	539	GAGAUUGA	CUGAUGAG	X	CGAA	AUCUUCUG	3048
2431	GAAGATCT C	AATCTCGG	540	CCGAGAUU	CUGAUGAG	X	CGAA	AGAUUCUC	3049

Table 37

2435	ATCTCAAT C TCGGAAT	541	AUUCCTGA CUGAUGAG X CGAA AUUGAGAU	3050
2437	CTCAATCT C GGAATCT	542	AGAUUCCC CUGAUGAG X CGAA AGAUUGAG	3051
2444	TCGGGAAT C TCAATGTT	543	AACAUUGA CUGAUGAG X CGAA AUUCCTGA	3052
2446	GGAATCT C AATGTTAG	544	CUAACAUU CUGAUGAG X CGAA AGAUUCCC	3053
2452	CTCAATGT T AGTATTC	545	GGAUUACU CUGAUGAG X CGAA ACAUUGAG	3054
2453	TCAATGTT A GTATTCCT	546	AGGAUAC CUGAUGAG X CGAA AACAUUGA	3055
2456	ATGTTAGT A TTCCTGG	547	CCAAGGAA CUGAUGAG X CGAA ACUACAU	3056
2458	GTTAGTAT T CTTTGGAC	548	GUCCAAAG CUGAUGAG X CGAA AUACUAA	3057
2459	TTAGTATT C TTGGACA	549	UGUCCAAG CUGAUGAG X CGAA AAUACUAA	3058
2462	GTATTCCT T GGACACAT	550	AUGUGUCC CUGAUGAG X CGAA AGGAUAC	3059
2471	GGACACAT A AGTGGA	551	UCCCAACC CUGAUGAG X CGAA AUGUGUCC	3060
2484	GGAAGACT T TACGGGCG	552	GCCCCGUA CUGAUGAG X CGAA AGUUTUCC	3061
2485	GGAAGACT T ACGGGGCT	553	AGCCCCGU CUGAUGAG X CGAA AAGUUTUCC	3062
2486	GAACTTT A CGGGGCTT	554	AAGCCCCG CUGAUGAG X CGAA AAGUUTUCC	3063
2494	ACGGGGCT T TATTCCTC	555	GAAGAAUA CUGAUGAG X CGAA AGCCCCGU	3064
2495	CGGGGCTT T ATTTCTCT	556	AGAAGAAU CUGAUGAG X CGAA AAGCCCCG	3065
2496	GGGGGCTT A TTCTCTA	557	UAGAAGAA CUGAUGAG X CGAA AAGCCCCC	3066
2498	GGCTTTAT T CTCTACG	558	CGUAGAG CUGAUGAG X CGAA AUAAAGCC	3067
2499	GCTTTATT C TTCTAGG	559	CCGUAGAA CUGAUGAG X CGAA AAUAAAGC	3068
2501	TTTATTTCT T CTACGTA	560	UACCGUAG CUGAUGAG X CGAA AGAAUAAA	3069
2502	TATTTCTT C TACGTAAT	561	GUACCGUA CUGAUGAG X CGAA AAGAAUAA	3070
2504	ATTTCTCT A CGTACTT	562	AGGUACCG CUGAUGAG X CGAA AAGUAGAU	3071
2509	TCTACGTT A CCTTCTT	563	AAGCAAGG CUGAUGAG X CGAA ACCGUAGA	3072
2513	CGTCTTAT T CTTTAAAT	564	AUUAAGC CUGAUGAG X CGAA AAGUACCG	3073
2517	ACCTTGCT T TAATCTTA	565	UAGGAUUA CUGAUGAG X CGAA AGCAAGGU	3074
2518	CCTTGCTT T AATCTTAA	566	UUAGGAUU CUGAUGAG X CGAA AAGCAAGG	3075
2519	CTTGCTTT A ATCTTAAA	567	UUUAGGAU CUGAUGAG X CGAA AAAGCAAG	3076
2522	GCTTTAAT C TAAATAGG	568	CCAUUUAG CUGAUGAG X CGAA AUUAAAGC	3077
2525	TTAATCTT C ATTCGCAA	569	UUGCCAUA CUGAUGAG X CGAA AGGAUUAA	3078
2537	GGCAAACT C TTCTTTTT	570	AAAAGAA G CUGAUGAG X CGAA AGUUGUCC	3079
2540	AAACTCCT T TTTTCTCT	571	AGGAAAG CUGAUGAG X CGAA AGGAGUUT	3080
2541	AACTCCTT T TTTTCTCT	572	CAGGAAA CUGAUGAG X CGAA AAGGAGUU	3081
2543	CTCCTTCT T TTCTGAC	573	GUCAGGAA CUGAUGAG X CGAA AGAAGGAG	3082
2544	TCTTCTTT T TCTTGACA	574	UGUCAGGA CUGAUGAG X CGAA AAGAAGGA	3083
2545	CCTTCTTT T CTGACAT	575	AUGUCAGG CUGAUGAG X CGAA AAGAAGG	3084
2546	CTTCTTTT C CTGACAT	576	AUUGUCAG CUGAUGAG X CGAA AAAAGAGG	3085
2554	CTGACAT T CATTTGCA	577	UGCAAAUG CUGAUGAG X CGAA AUGUCAGG	3086
2555	CTGACAT T ATTTGCA	578	CUGCAAAU CUGAUGAG X CGAA AAUGUCAG	3087
2558	ACATTCAT T TGACGAG	579	CUCUCGCA CUGAUGAG X CGAA AUGAUGU	3088
2559	CATTCAT T CGAGGAG	580	CCUCCUGC CUGAUGAG X CGAA AAUGAUG	3089
2572	GAGGACAT T GTTGATAG	581	CUAUCAC CUGAUGAG X CGAA AUGUCUC	3090
2575	GACTTGT T GATGATG	582	CAUCUAC CUGAUGAG X CGAA ACAUGUC	3091
2579	TTGTTGAT A GATGTAAG	583	CUUACAUC CUGAUGAG X CGAA AUACACAA	3092
2585	ATAGATGT A AGCAATTT	584	AAAUUGCU CUGAUGAG X CGAA ACAUCUUA	3093
2592	TAGCAAT T TGTGGGCG	585	GCCCCACA CUGAUGAG X CGAA AUUGUCUA	3094
2593	AAGCAAT T GTGGGGCC	586	GGCCCCAC CUGAUGAG X CGAA AUUGUCUA	3095
2605	GAGGCCCT T ACATGAAA	587	UUUACUGU CUGAUGAG X CGAA AGGGGCC	3096
2606	GGGCCCTT A CATGAAA	588	AUUUACUG CUGAUGAG X CGAA AAGGGGCC	3097
2611	CTTACAGT A AATGAAA	589	UUUUCAUU CUGAUGAG X CGAA ACUGUAG	3098
2629	AGGAGACT T AATTAAC	590	GUUAAUUU CUGAUGAG X CGAA AGUUCUCC	3099
2630	GGAGACTT A AATTAAC	591	AGUUAUUU CUGAUGAG X CGAA AAGUCUCC	3100

Table 37

2634	ACTTAAAT T AACTATGC	592	GCAUAGUU CUGAUGAG X CGAA AUUUUAAGU	3101
2635	CTTAAAT T ACTATGCC	593	GGCAUAGU CUGAUGAG X CGAA AAUUUAAG	3102
2639	AATTAAC T TGCCTGCT	594	AGCAGGCA CUGAUGAG X CGAA AGUUUAUU	3103
2648	TGCTGCT T GGTTTTAT	595	UAUAAACC CUGAUGAG X CGAA AGCAGGCA	3104
2652	TGCTAGGT T TTATCCCA	596	UGGGAUAA CUGAUGAG X CGAA ACCUAGCA	3105
2653	GCTAGGTT T TATCCCAA	597	UUGGGAAU CUGAUGAG X CGAA AACCUAGC	3106
2654	CTAGGTTT T ATCCCAAT	598	AUUGGGAU CUGAUGAG X CGAA AAACCUAG	3107
2655	TAGGTTTT T TCCCAATG	599	CAUUGGGA CUGAUGAG X CGAA AAAACCUA	3108
2657	GGTTTTAT C CCAATGTT	600	AACAUUGG CUGAUGAG X CGAA AUAAACC	3109
2665	CCAATGTT T ACTAATA	601	UAUUUAGU CUGAUGAG X CGAA ACAUUGGG	3110
2666	CCAATGTT T CTAATAT	602	AUAUUUAG CUGAUGAG X CGAA AACAUUGG	3111
2669	ATGTTACT T AATATTGG	603	CAAAUAUU CUGAUGAG X CGAA AAUAACAU	3112
2673	TACTAAAT T TTGCGCT	604	AGGCAAA CUGAUGAG X CGAA AUUUUAGU	3113
2675	CTAAATAT T TGCCCTTA	605	UAAGGCA CUGAUGAG X CGAA AUATUUAG	3114
2676	TAAATATT T TGCTTAG	606	CUAAGGCG CUGAUGAG X CGAA AAUAUUUA	3115
2682	TTTGCCCT T AGATAAAG	607	CUUUUAUU CUGAUGAG X CGAA AGGCAAAA	3116
2683	TTTGCCCT T TATCAAGG	608	CCUUUAUC CUGAUGAG X CGAA AAGGCAAA	3117
2687	CCTTAGAT T AAGGATTC	609	GAUCCUUU CUGAUGAG X CGAA AUUUUAGG	3118
2695	AAAGGGAT C AAACCGTA	610	UACGGUUU CUGAUGAG X CGAA AUCCUUUU	3119
2703	CAACCGGT T TTATCCAG	611	CUGGAUAA CUGAUGAG X CGAA ACGGUUUG	3120
2705	AACCGGAT T ATCCAGAG	612	CUCUGGAU CUGAUGAG X CGAA AUACGGUU	3121
2706	ACCGTATT T ATCCAGAT	613	ACUCUGGA CUGAUGAG X CGAA AAUACGGU	3122
2708	CGTATTAT C CAGAGTAT	614	AUACUCUG CUGAUGAG X CGAA AUUAUACG	3123
2715	TGCAGAGT A TGTAATTA	615	UAACUACA CUGAUGAG X CGAA ACUCUGGA	3124
2719	GAGTAATG T GTTAATCA	616	UGAUUAAC CUGAUGAG X CGAA ACAUACUC	3125
2722	TATGATGT T AATCATTA	617	UAUUAUUU CUGAUGAG X CGAA ACUACUAU	3126
2723	ATGTAGTT A ATCAITAC	618	GUAUUGAU CUGAUGAG X CGAA AACUACAU	3127
2726	TAGTTAAT C ATTACTTC	619	GAAUUAUU CUGAUGAG X CGAA AUUAACUA	3128
2729	TTAATCAT T ACTTCAG	620	CUGGAAGU CUGAUGAG X CGAA AUGAUUAA	3129
2730	TAATCAT T GTTCACAG	621	UCUGGAAG CUGAUGAG X CGAA AAUGAUUA	3130
2733	TCATTACT T CCAGACGC	622	CGCUCUGG CUGAUGAG X CGAA AGUAUAUA	3131
2734	CATTACTT C CAGACCGG	623	CGCUCUGU CUGAUGAG X CGAA AAGUAUUG	3132
2747	CGCGACAT T ATTTACAC	624	GUGUAAAU CUGAUGAG X CGAA AUGUCGCG	3133
2748	GCGACATT A TTTACACA	625	UGUGUAAA CUGAUGAG X CGAA AAUGUCGC	3134
2750	GACATTAT T TACACACT	626	AGUGUGUA CUGAUGAG X CGAA AAUAUGUC	3135
2751	ACATTATT T ACACACTC	627	GAGUGUGU CUGAUGAG X CGAA AAUAUUGU	3136
2752	CATTATT T ACACACTC	628	AGAGUGUG CUGAUGAG X CGAA AAUAUUGU	3137
2759	TACACACT C TTTGGAAG	629	CUUCCAAA CUGAUGAG X CGAA AGUGUGUA	3138
2761	CACACTCT T TGAAGGCG	630	GCCUCCAA CUGAUGAG X CGAA AGAGUGUG	3139
2762	ACACTCTT T GGAAGGCG	631	CGCCUCCU CUGAUGAG X CGAA AAGAGUGU	3140
2776	GCGGGGAT C TTATATAA	632	UUUAUAAA CUGAUGAG X CGAA AUCCCGCG	3141
2778	GGGATCTT T ATATAAAA	633	UUUUUAUU CUGAUGAG X CGAA AAGUCCCG	3142
2779	GGGATCTT A TATAAAA	634	CUUUUAUU CUGAUGAG X CGAA AAGUCCCG	3143
2781	GATCTTAT A TAAAGAG	635	CUCUUUUA CUGAUGAG X CGAA AUAGAUAU	3144
2783	TCTTTAT A AAAGAGAG	636	CUCUUUUA CUGAUGAG X CGAA AUUAAGAUA	3145
2793	AAGAGAGT C CACACGTA	637	UACGUGUG CUGAUGAG X CGAA ACUCUCUU	3146
2801	CCACAGCT A GCCTCTCA	638	UGAGGCGC CUGAUGAG X CGAA ACGUGUGG	3147
2808	TAGCGCT C ATTTTGGC	639	CGCAAAAU CUGAUGAG X CGAA AAGCGCUA	3148
2811	CGCTCTAT T TTGCGGCT	640	ACCCGCAA CUGAUGAG X CGAA AUGAGGCG	3149
2812	GCCTCAT T TGCGGGTC	641	GACCCGCA CUGAUGAG X CGAA AAUAGGCG	3150
2813	CCTCATTT T GCGGGTCA	642	UGACCCGC CUGAUGAG X CGAA AAUAGGCG	3151

Table 37

2820	TTGCGGGT C ACCATATT	643	AAUAUGGU CUGAUGAG X CGAA ACCCGCAA	3152
2826	GTCCACAT A TTCTTGGG	644	CCCAAGAA CUGAUGAG X CGAA AUGGUGAC	3153
2828	CACCATAT T CTTGGGAA	645	UUCGCCAG CUGAUGAG X CGAA AUAUGGUG	3154
2829	ACCATATT T TTGGGAAC	646	GUUCCCAA CUGAUGAG X CGAA AUAUGGUG	3155
2831	CATATTCT T GGAACAA	647	UUGUUCCT CUGAUGAG X CGAA AGAAUUAU	3156
2843	AAACAAGT C TACAGCAT	648	AUGCUGUA CUGAUGAG X CGAA AUCUUGUJ	3157
2845	CAAGATCT A CAGCATGG	649	CCAUGCUG CUGAUGAG X CGAA AGAUUCUG	3158
2859	TGGGAGGT T GGTCTTCC	650	GGAGAGCC CUGAUGAG X CGAA ACCUCCCA	3159
2863	AGTTTGGT C TTCAAAAC	651	GUUUGGAA CUGAUGAG X CGAA ACCAAACU	3160
2865	GTGGTCTT T CCAAACTT	652	AGGUUUGG CUGAUGAG X CGAA AGACCAAC	3161
2866	TTGGTCTT C CAAACCTT	653	GAGGUUUG CUGAUGAG X CGAA AAGACCAA	3162
2874	CCAAACCT C GAAAGGCC	654	GCUUUUUG CUGAUGAG X CGAA AGGUUUGG	3163
2895	GGACAAAT C TTTCTGTC	655	GACAGAAA CUGAUGAG X CGAA AUUUGUCC	3164
2897	ACAAATCT T TCTGTCCC	656	GGGACAGA CUGAUGAG X CGAA AGAUUUGU	3165
2898	CAAACTTT T CTGTCCCC	657	GGGGACAG CUGAUGAG X CGAA AAGAUUUG	3166
2899	AAATCTTT C TGTCCCCA	658	UGGGGACA CUGAUGAG X CGAA AAGAUUUG	3167
2903	CTTTCTGT C CCAATACC	659	GGAUUGGG CUGAUGAG X CGAA AGAUUUGG	3168
2910	TCCCCAAT C CCTCGGGA	660	UCCCAAGG CUGAUGAG X CGAA AUUGGGGA	3169
2920	CCTGGGAT T CTTCCCGG	661	CGGGGAAG CUGAUGAG X CGAA AUCCGAGG	3170
2921	CTGGGATT C TTCCCGGA	662	UCGGGGAA CUGAUGAG X CGAA AAUCCGAG	3171
2923	GGGATTTT C CCCCAGTC	663	GAUCGGGG CUGAUGAG X CGAA AGAAUCCC	3172
2924	GGATTTCT C CCGATGCA	664	UGAUCGGG CUGAUGAG X CGAA AAGAUUCC	3173
2931	TCCCCGAT C ATCAATGT	665	CAACUGAU CUGAUGAG X CGAA AUCCGGGA	3174
2934	CCGATCAT C AGTTGGAC	666	GUCCAACU CUGAUGAG X CGAA AUAUCGGG	3175
2938	TCATCAGT T GACCCCTG	667	CAGGGUCC CUGAUGAG X CGAA ACUGAUGA	3176
2950	CCTGCAT T CAAAGCCA	668	UUGCUUUG CUGAUGAG X CGAA AUGCAGGG	3177
2951	CCTGCATT C AAGGCCAA	669	UUGCUUUG CUGAUGAG X CGAA AAUGCAGG	3178
2962	AGCCAAC T AGTAAATC	670	GAUUUAU CUGAUGAG X CGAA AGUUGGCU	3179
2966	AACTCAGT A AATCCAGA	671	UCUGGAUU CUGAUGAG X CGAA ACUGAGUU	3180
2970	CAGTAAAT C CAGATTGG	672	CCAAUUCG CUGAUGAG X CGAA AUUUAUUG	3181
2976	ATCCAGAT T GGGAGCTC	673	GAGGUUCC CUGAUGAG X CGAA AUCUGGAU	3182
2984	TGGGACCT C AACCCGCA	674	UGCGGGUU CUGAUGAG X CGAA AGGUCCCA	3183
3037	GGGAGCAT T CGGGCCAG	675	CUGGCCCG CUGAUGAG X CGAA AUGCUCCC	3184
3038	GGAGCATT C GGGCCAGG	676	CTUGGCCG CUGAUGAG X CGAA AAUGCUCC	3185
3049	GCCAGGGT T CACCCTCT	677	GAGGGGUG CUGAUGAG X CGAA ACCCUUGC	3186
3050	CCAGGGTT C ACCCTCTC	678	GGAGGGGU CUGAUGAG X CGAA AACCTUGG	3187
3057	TCACCCCT C CCAATGGG	679	CCCAUUGG CUGAUGAG X CGAA AGUAGGCC	3188
3073	GGGACTGT T GGGTGA	680	UCCACCCC CUGAUGAG X CGAA ACAGUCCC	3189
3087	GGAGCCCT C AGCTCAG	681	CUGAGGUU CUGAUGAG X CGAA AGGGUCCC	3190
3093	CTCACGCT C AGGGCCTA	682	UAGGCCCU CUGAUGAG X CGAA AGCGUAGG	3191
3101	CAGGGCCT A CTCACAAC	683	GUUGUGAG CUGAUGAG X CGAA AGGCCUUG	3192
3104	GGCTACT C AGCACTGT	684	ACAGUUGU CUGAUGAG X CGAA AGUAGGCC	3193
3123	CAGCAGCT C CTCCTCTC	685	AGGAGGAG CUGAUGAG X CGAA AGCUGCUG	3194
3126	CAGCTCTC C CTCCTGCC	686	GGCAGGAG CUGAUGAG X CGAA AGGAGCUG	3195
3129	CTCTCTCT C CTGCTCC	687	GGAGGGAG CUGAUGAG X CGAA AAGAGGAG	3196
3136	TCCTGCTC C CACCAATC	688	GAUUGGUG CUGAUGAG X CGAA AGGCAGGA	3197
3144	CCACCAAT C GGCAGTCA	689	UAGCUGCC CUGAUGAG X CGAA AUUGGUGG	3198
3151	TCGGCAGT C AGGAAGGC	690	GCUCUCCU CUGAUGAG X CGAA ACUGCCGA	3199
3165	GGCAGCCT A CTCCTTTA	691	UAAGGGAG CUGAUGAG X CGAA AGCUGGCC	3200
3168	AGCTTACT C CTTTATCT	692	AGAUAAGG CUGAUGAG X CGAA AGUAGGCC	3201
3172	TACTCCCT T ATCTCCAC	693	GUGGAGAU CUGAUGAG X CGAA AGGAGGUA	3202

Table 3/

3173	ACTCCCTT A TCTCCACC	694	GGUGGAGA CUGAUGAG X CGAA AAGGGAGU	3203
3175	TCCCTTAT C TCCACCTC	695	GAGGUGGA CUGAUGAG X CGAA AUAAGGGA	3204
3177	CCTTATCT C CACCTCTA	696	UAGAGGUG CUGAUGAG X CGAA AGAUAAGG	3205
3183	CTCCACCT C TAAGGGAC	697	GUCCCUUA CUGAUGAG X CGAA AGGUGGAG	3206
3185	CCACCTCT A AGGGACAC	698	GUGUCCCU CUGAUGAG X CGAA AGAGGUGG	3207
3195	GGGACACT C ATCCTCAG	699	CUGAGGAU CUGAUGAG X CGAA AGUUCUCC	3208
3198	ACACTCAT C CTCAGGCC	700	GGCCUGAG CUGAUGAG X CGAA AUGAGUGU	3209
3201	CTCATCCT C AGGCCATG	701	CAUGGCCU CUGAUGAG X CGAA AGGAUGAG	3210

Input Sequence = AF100308. Cut Site = UH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)

AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 38

Table 38: Human HBV Inozyme and Substrate Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
9	AACCTCAC C ACTTTC	702	UGGAAAGU CUGAUGAG X CGAA IUGGAGUU	3211
10	ACTCCACC A CTTTCC	703	GUGGAAAG CUGAUGAG X CGAA IUGGAGUU	3212
12	TCACACAC T TTCCACCA	704	UGGUGGAA CUGAUGAG X CGAA IUGGAGUU	3213
16	CCACTTTC C ACCAACT	705	AGUUUUGU CUGAUGAG X CGAA IAAAGUGG	3214
17	CACITTC C CCAAACT	706	GAGUUUGU CUGAUGAG X CGAA IAAAGUGG	3215
19	CTTTCAC C AAATCTT	707	AAGAGUUU CUGAUGAG X CGAA IUGGAAAG	3216
20	TTTCCACC A AACTCTT	708	GAAGAGUU CUGAUGAG X CGAA IUGGAGAA	3217
24	CACCAAC T TCAAGA	709	UCUUGAAG CUGAUGAG X CGAA IAUUGUGG	3218
26	CCAAACT C TCAAGATC	710	GAUCUUGA CUGAUGAG X CGAA IAUUGUGG	3219
29	AACTCTT C AGATCCCA	711	UGGGAUCU CUGAUGAG X CGAA IAAAGUUU	3220
35	TCAGATC C CAGAGTCA	712	UGACUCUG CUGAUGAG X CGAA IAUUCUGA	3221
36	CAAGATCC C AAGTCAAG	713	CUGACUCU CUGAUGAG X CGAA IGAUCUUG	3222
37	AAGATCC C AGATCAAG	714	CCUGACUC CUGAUGAG X CGAA IGAUCUUG	3223
43	CCAGATC A GGGCCCTG	715	CAGGGCCC CUGAUGAG X CGAA IACUCUGG	3224
48	GTACGGG C CTGTACTT	716	AAGUACAG CUGAUGAG X CGAA ICCCUGA	3225
49	TCAGGGCC C TGATCTTT	717	AAAGUACA CUGAUGAG X CGAA ICCCUGA	3226
50	CAGGGCCC T GTACTTTT	718	GAAGUAC CUGAUGAG X CGAA ICCCUGG	3227
55	CCCTGTAT C TGCTGTCT	719	AGACAGAA CUGAUGAG X CGAA IACAGAGG	3228
59	GACTTTT C TGCTGTCT	720	CACACGCA CUGAUGAG X CGAA IAAAGUAC	3229
60	TACTTTT C GCTGTGTG	721	CCACGAGC CUGAUGAG X CGAA IAAAGUAC	3230
63	TTCTGTG C GGTGTGTG	722	GAGCCACC CUGAUGAG X CGAA IACAGAAA	3231
70	CTGGTGG C CAGATTCA	723	UGAACUGG CUGAUGAG X CGAA ICCCAGAG	3232
72	GGTGGCT C AGTTCAGG	724	CCUGAACU CUGAUGAG X CGAA ICCCAGAG	3233
73	GTGGCTC C GTTCAGGA	725	UCCUGAAC CUGAUGAG X CGAA IAGCCAC	3234
78	TCAGATT C GGAACAGT	726	ACUGUACC CUGAUGAG X CGAA IAAUCUGA	3235
84	TCAGGAAC A GTAGCCCC	727	GGGCUCAC CUGAUGAG X CGAA IUUCUGA	3236
91	CAGTGAAC C CTGCTCAG	728	CUGAGCAG CUGAUGAG X CGAA ICUCACUG	3237
92	AGTGAACC C TGCTCAGA	729	UCUGAGCA CUGAUGAG X CGAA IGCUCACU	3238
93	GTAGGCC C GCTCAGAA	730	IUUCGAGC CUGAUGAG X CGAA IGGCUCAC	3239
96	AGCCCTGC T CAGAAATC	731	GAUUCUG CUGAUGAG X CGAA ICAAGGCU	3240
98	CCCTGCTC A GAATACTG	732	CAQUAUUC CUGAUGAG X CGAA TAGCAGG	3241
105	CAGAAATC T GTCTCTGC	733	GCAGAGAC CUGAUGAG X CGAA IAUUCUG	3242
109	ATACTGTC T CTGCTAGA	734	UAUGGCAG CUGAUGAG X CGAA IACNGAUU	3243
111	ACTGTCTC T GGCATATC	735	GAUUGGC CUGAUGAG X CGAA TAGACAGU	3244
114	GTCTCTGC C ATATCTGC	736	GACGAUUA CUGAUGAG X CGAA ICAAGAGC	3245
115	TCTCTGCC A TATCGTCA	737	UGACGAUA CUGAUGAG X CGAA TGCAGAGA	3246
123	ATATCTGC A ATCTTATC	738	GAUAGAUA CUGAUGAG X CGAA IACGAUUA	3247
127	CGTCAATC T TATCGAAG	739	CUUCGAUA CUGAUGAG X CGAA IUAUGACG	3248
138	TCGAAGAC T GGGGACCC	740	GGGUCCCC CUGAUGAG X CGAA IUCUUGCA	3249
145	CTGGGAC C CTGTACCG	741	CGGUACAG CUGAUGAG X CGAA IUCCCGAG	3250
146	TGGGGACC C TGATACCG	742	UCGGUACA CUGAUGAG X CGAA IGUCCCCA	3251
147	GGGACCC T GTACCGAA	743	UUCGGUAC CUGAUGAG X CGAA IGGUCCCC	3252
152	CCCTGTAT C GAACATGG	744	CCAUGUUC CUGAUGAG X CGAA IUAAGGG	3253
157	TACCGAAC A TGGAGAAC	745	GUUCUCCA CUGAUGAG X CGAA IUUCUGUA	3254
166	TGGAGAAC A TCGCATCA	746	UGAUGCGA CUGAUGAG X CGAA IUUCUGUA	3255
171	AACATCGC A TCAGACTC	747	AGUCCUGA CUGAUGAG X CGAA IUCAGUUA	3256
174	ATCGCATC A GGACTCCT	748	AGGAGUCC CUGAUGAG X CGAA IAUCCGAU	3257

Table 38

179	ATCAGGAC T CCTAGGAC	749	GUCCUAGG CUGAUGAG X CGAA IUCCUGAU	3258
181	CAGGACTC C TAGGACCC	750	GGGUCCUA CUGAUGAG X CGAA IAGUCCUG	3259
182	AGGACTCC T AGGACCCC	751	GGGUCCU CUGAUGAG X CGAA IAGUCCUG	3260
188	CCTAGGAC C CCGTCTCG	752	CGAGCAGG CUGAUGAG X CGAA IUCCUAGG	3261
189	CTAGGACC C CTGCTCGT	753	ACGAGCAG CUGAUGAG X CGAA IGUCCUAG	3262
190	TAGGACCC C TGCTCGTG	754	CACGAGCA CUGAUGAG X CGAA IGGUCCUA	3263
191	AGGACCCC T GCTCGTGT	755	ACAGGAGC CUGAUGAG X CGAA IGGUCCU	3264
194	ACCCCTGC T CCGTGTAC	756	GUACACAG CUGAUGAG X CGAA ICAAGGGU	3265
203	CGTGTAC A GCGCGGGT	757	ACCCCGCC CUGAUGAG X CGAA IUACACAG	3266
217	GGTTTTTC T TGTGACA	758	UGUCAACA CUGAUGAG X CGAA IAAAAACC	3267
225	TTGTGTAC A AAAATCCT	759	AGGAUUUU CUGAUGAG X CGAA IUACACAA	3268
232	CAAAAATC C TCACAATT	760	UAUUUGGA CUGAUGAG X CGAA IAUUUUUG	3269
233	AAAAATCC T CACAATAC	761	GUUUUGUG CUGAUGAG X CGAA IGAUUUUU	3270
235	AAATCCTC A CAATACCA	762	UGGUUUUG CUGAUGAG X CGAA IAGGAUUU	3271
237	ATCTCTAC A ATACCACA	763	UGUUGUAU CUGAUGAG X CGAA IUAGAGAU	3272
242	CACAATAC C ACAGAGTC	764	GACUCUGU CUGAUGAG X CGAA IUUUUGUG	3273
243	ACAATACC C CAGAGTCT	765	AGACUCUG CUGAUGAG X CGAA IAUUUUGU	3274
245	AATACCAC A GAGTCTAG	766	CUAGACUC CUGAUGAG X CGAA IUGGUUUU	3275
251	ACGAGTGC A AGTACTGT	767	ACGAGUCU CUGAUGAG X CGAA IACUCUGU	3276
256	CTGTAGAC T CGTGTGGG	768	CCACACAG CUGAUGAG X CGAA IUUUUAGC	3277
267	TGTTGAGC T TCTCTCAA	769	IUGAGAGA CUGAUGAG X CGAA IUCCACCA	3278
270	TGGACTTC T CCAATTTT	770	AAAUUGGA CUGAUGAG X CGAA IAUUUCCA	3279
272	GACTTCTC T CAATTTTC	771	GAUUUUUG CUGAUGAG X CGAA IAGAGUUC	3280
274	CTTCTCTC A ATTTTCTA	772	UAGAAUUU CUGAUGAG X CGAA IAGAGAAG	3281
281	CAATTTTC T AGGGGGAA	773	IUCCCCCU CUGAUGAG X CGAA IAAAUUUG	3282
291	GGGGGAAC A CCCGTGTG	774	CACACGGG CUGAUGAG X CGAA IUCCCCCC	3283
293	GGGAACAC C CGTGTGTC	775	GACACACG CUGAUGAG X CGAA IUGUUUCC	3284
294	GGAAACAC C GTGTGTCT	776	AGACACAC CUGAUGAG X CGAA IUGUUUCC	3285
302	CGTGTGTC T TGGCCAAA	777	IUUUGGCA CUGAUGAG X CGAA IACACACG	3286
307	GTCTTGCC C AAAATTCG	778	CGAAUUUU CUGAUGAG X CGAA ICCAAGAC	3287
308	TCTTGCC C AAAATTCG	779	GCAGAUUU CUGAUGAG X CGAA IGCCAAAG	3288
317	AAATTCGC A GTCCCAA	780	IUUUGGAC CUGAUGAG X CGAA ICGAAUUU	3289
321	TCGCAGTC C CAAATCTC	781	GAGAUUUU CUGAUGAG X CGAA IACUCCGA	3290
322	CGCAGTCC C AAATCTCC	782	GGAGAUUU CUGAUGAG X CGAA IGACUGCG	3291
323	CAGTGTCC A ATTTCTCA	783	UGGAGAUU CUGAUGAG X CGAA IAGACUCC	3292
328	CCCAATTC T CCAAGTAC	784	GUGACUGG CUGAUGAG X CGAA IAUUUUGG	3293
330	CAAAATTC C GTCACTC	785	GAGUGACU CUGAUGAG X CGAA IAGAUUUU	3294
331	AAATCTCC A ATCACTCA	786	UGAGUGAC CUGAUGAG X CGAA IGAGAUUU	3295
335	CTCAGATC A CTCACCAA	787	IUUUGGUG CUGAUGAG X CGAA IACUGGAG	3296
337	CCAGTAC C CACCAACC	788	GGUUGGUG CUGAUGAG X CGAA IUGUGGUG	3297
339	AGTCACTC A CCAACTGT	789	CAGGUUGG CUGAUGAG X CGAA IAGUGACU	3298
341	TCACTCAC C AACCTGTT	790	AACAGGUU CUGAUGAG X CGAA IUGAGUGA	3299
342	CACTACAC A ACTGTGTT	791	CAACAGGU CUGAUGAG X CGAA IUGAGUGU	3300
345	TACCAAAC C TGTGTGCT	792	GGACAACA CUGAUGAG X CGAA IUUGUGGA	3301
346	CACCAACC C TGTGTGCT	793	AGGACACA CUGAUGAG X CGAA IUGUGGUG	3302
353	CTGTGTGC C TCCAATTT	794	AAAUUGGA CUGAUGAG X CGAA IACCAACG	3303
354	TGTTGTCC T CCAATTTT	795	CAAAUUGG CUGAUGAG X CGAA IGACAAAC	3304
356	TGTTGTCC C AATTGTCT	796	GACAAAUU CUGAUGAG X CGAA IAGGACAA	3305
357	TGTTGTCC A ATTTGTCC	797	GGACAAAU CUGAUGAG X CGAA IAGGAGCA	3306
365	AATTTGTC C TGGTATCG	798	GAUAAACA CUGAUGAG X CGAA IACAAAUU	3307
366	ATTTGTCC T GGTATTCG	799	CGAUAAAC CUGAUGAG X CGAA IGACAAAU	3308

Table 38

376	GTATATCGC T GGATGTGT	800	ACACAUC CUGAUGAG X CGAA ICGAUAAC	3309
386	GATGTGTC T GCGGCGTT	801	AACGCGC CUGAUGAG X CGAA IACACAUC	3310
400	GTTTTATC A TCTTCTCT	802	GAGGAAGA CUGAUGAG X CGAA IAUAAAAC	3311
403	TATATCATC T TCCITCTGC	803	GCAGAGGA CUGAUGAG X CGAA IAUUAUA	3312
406	TCATCTTTC C TCTGCTATC	804	GAUGCAGA CUGAUGAG X CGAA IAAGAUGA	3313
407	CATCTTCC T CTGCTATCC	805	GGAUGCAG CUGAUGAG X CGAA IGAAGAUG	3314
409	TCTTCTCTC T GCATCTGTT	806	CAGGAUGC CUGAUGAG X CGAA IAGGAAGA	3315
412	TCCTCTGCA T TCCTGCTG	807	CAGCAGGA CUGAUGAG X CGAA ICAGAGGA	3316
415	TCTGCTATC C TGCTGCTA	808	UAGCAGCA CUGAUGAG X CGAA IAUUCAGA	3317
416	CTGCATCC T GCTGCTAT	809	AUAGCAGC CUGAUGAG X CGAA IGAUGCAG	3318
419	CATCTTGC T GCTATGCC	810	GGCAUAGC CUGAUGAG X CGAA ICAAGAUG	3319
422	CTGCTGTC T ATGCTTCA	811	UGAGGCAU CUGAUGAG X CGAA ICAGCAGG	3320
427	TGCTATGC C TCATCTTC	812	GAAGAUGA CUGAUGAG X CGAA ICAUAGCA	3321
428	GCTATGCC T CATCTTCT	813	AGAAGAUG CUGAUGAG X CGAA IGCUAAGC	3322
430	TATGCTTC T TCTTCTTG	814	CAAGAAGA CUGAUGAG X CGAA IAGGCAUA	3323
433	GCTCATC T TCTTCTTG	815	CAACAAGA CUGAUGAG X CGAA IAUAGGCC	3324
436	TCATCTTC T TGTGGTGT	816	AACCAACA CUGAUGAG X CGAA IAGAUGA	3325
446	GTGGTTC T TCTGGACT	817	AGUCCAGA CUGAUGAG X CGAA IAACCAAC	3326
449	GGTCTTC T GGAATATC	818	GAUAGUCC CUGAUGAG X CGAA IAAGAACC	3327
454	TTCTGGAC T ATCAAGT	819	ACCUAGU CUGAUGAG X CGAA IUCCAGAA	3328
458	GGACTATC A AGGTATGT	820	ACAUAUCC CUGAUGAG X CGAA IAUAGUCC	3329
470	TATGTTGC C GTTGTGTC	821	GACAAAC CUGAUGAG X CGAA IACAUAUA	3330
471	ATGTTGCC C GYTTGTCC	822	GGACAAAC CUGAUGAG X CGAA IGCACAU	3331
479	CGTGTGTC C TCTAATTC	823	GAUAUAGA CUGAUGAG X CGAA TACAAACG	3332
480	GTGTTGCC T CTAATTC	824	GGAUAUAG CUGAUGAG X CGAA IAGCAAAC	3333
482	TTGTCTTC T AATTCCAG	825	CUGGAUUC CUGAUGAG X CGAA IAGGACAA	3334
488	TCTAATTC C AGGATCAT	826	AUGAUCCU CUGAUGAG X CGAA IAAUUAUA	3335
489	CTAATTCC A AGGATCAT	827	GAUGAUCC CUGAUGAG X CGAA IGAUUAUA	3336
495	CCAGGATC A TCAACAAC	828	GUUGUUGA CUGAUGAG X CGAA IAUCCUGG	3337
498	GGATCATC A ACAACCA	829	CUGGUUGU CUGAUGAG X CGAA IAUAGUCC	3338
501	TCATCAAC A ACCAGCAC	830	GUGCUGGU CUGAUGAG X CGAA IUUGAUGA	3339
504	TCAACAAC C AGCACCG	831	CCGGUGCU CUGAUGAG X CGAA IUUGUUGA	3340
505	CAACAACC A GCCACCGA	832	UCCGGUGC CUGAUGAG X CGAA IGUUGUUG	3341
508	CAACCAAC C CCGGACCA	833	UGGUCGG CUGAUGAG X CGAA ICGGUUG	3342
510	ACCAAGAC C GCAACATG	834	CAUGGUCC CUGAUGAG X CGAA IUGUGUGU	3343
515	CACCGGAC C ATGCAAAA	835	UUUUGCAU CUGAUGAG X CGAA IUCCGGUG	3344
516	ACCGGACC A TGCAAAAC	836	GUUUUGCA CUGAUGAG X CGAA IUGCCGGU	3345
520	GACCATGC A AAACCTGC	837	GCAGGUUU CUGAUGAG X CGAA ICAUGGUC	3346
525	TGCAAAAC C TGCACAAC	838	GUUGUGCA CUGAUGAG X CGAA IUUUUGCA	3347
526	GCAAAACC C TGCACAAC	839	AGUUGUCC CUGAUGAG X CGAA IGUUUUGC	3348
529	AAACCTGC A CAATCTCT	840	AGGAGUUG CUGAUGAG X CGAA ICAGGUUU	3349
531	ACCTGCAC A ACTCTCTG	841	GCAGGAGU CUGAUGAG X CGAA IAGGAGGU	3350
534	TGCACAAC T CTTGCTCA	842	UGAGCAGG CUGAUGAG X CGAA IUUGUGCA	3351
536	CACAACAT C TGCTCAAG	843	CUUGAGCA CUGAUGAG X CGAA IAGUUGUG	3352
537	ACAACCTC T GCTCAAGG	844	CCUUGAGC CUGAUGAG X CGAA IAGUUGUG	3353
540	ACTCTGTC T CAAGGAAC	845	GUUCCUUG CUGAUGAG X CGAA ICAGGAGU	3354
542	TCCTGCTC A AGGAACCT	846	AGGUUCCU CUGAUGAG X CGAA IAGCAGGA	3355
549	CAAGGAAC C TCTATGTT	847	AAACAUGA CUGAUGAG X CGAA IUUCCUUG	3356
550	AAGGAACC T CTATGTTT	848	AAACAUGA CUGAUGAG X CGAA IGUUCCUUG	3357
552	GGAACCTC T ATGTTTTC	849	GGAAACAU CUGAUGAG X CGAA IAGGUUCC	3358
560	TATGTTTC C CTCATGTT	850	AAACAUGA CUGAUGAG X CGAA IAAACAUA	3359

Table 38

561	ATGTTTCC C TCATGTTG	851	CAACAUGA CUGAUGAG X CGAA IGAAACA	3360
562	TGTTTCCC T CATGTGTC	852	GCAACAUG CUGAUGAG X CGAA IGGAAACA	3361
564	TTTCCCTC A TGTGCTG	853	CAGCAACA CUGAUGAG X CGAA IAGGAAAC	3362
571	CATGTTGC T GTACAAA	854	UUUUGUAC CUGAUGAG X CGAA ICACAAUG	3363
576	TGCTGTAC A AAACCTAC	855	GUAGGUU CUGAUGAG X CGAA IUACAGCA	3364
581	TACAAAAC C TACGACG	856	CGUCCGUA CUGAUGAG X CGAA IUUUUGUA	3365
582	ACAAAACC T ACGGACGG	857	CCGUCCGU CUGAUGAG X CGAA IGUUUUGU	3366
595	ACGGAATC T GCACCTGT	858	ACAGGUCC CUGAUGAG X CGAA IUUUCCGU	3367
598	GAAACTGC A CCGTATT	859	AAUACAGG CUGAUGAG X CGAA ICAUUUUC	3368
600	AACTGCAC C TGTATTCC	860	GGAAUACA CUGAUGAG X CGAA IUGCAGUU	3369
601	ACTGCACC T GTATTCCC	861	GGGAAUAC CUGAUGAG X CGAA IUGUCAGU	3370
608	CTGTATTCT C CATCGCAT	862	AUGGGAGU CUGAUGAG X CGAA IUUAACAG	3371
609	TGTATTCC C ATCCCATC	863	GAUUGGAU CUGAUGAG X CGAA IGAAUACA	3372
610	GTATTCCC A TCCCATCA	864	UGAUGGGA CUGAUGAG X CGAA IGGAAUAC	3373
613	TTCCTCAT C TCCATCTC	865	AGAUGAUG CUGAUGAG X CGAA IAUUGGAA	3374
614	TCCCATCC C ATCATCTT	866	AAGAUGAU CUGAUGAG X CGAA IGAUGGAA	3375
615	CCCATCCC A TCTCTTGT	867	CAAGAUGA CUGAUGAG X CGAA IGAUUGGG	3376
618	ATCCCATC A TCTTGGGC	868	GCCCAAGA CUGAUGAG X CGAA IAUUGGAU	3377
621	CCATCATC T TGGGCTTT	869	AAAGCCCA CUGAUGAG X CGAA IAUAGUUG	3378
627	TCTTGGGC T TTCGAAA	870	UUUGCGAA CUGAUGAG X CGAA ICCCAAGA	3379
633	GC'TTTCGC A AAATACCT	871	AGGUUUUU CUGAUGAG X CGAA ICGAAAGC	3380
640	CAAAATAC C TATGGGAG	872	CUCCCAUA CUGAUGAG X CGAA IUUUUUUG	3381
641	AAAATACC T ATGGGAGT	873	ACUCCCAU CUGAUGAG X CGAA IGUAUUUU	3382
654	GAGTGGGC C TCAGTCG	874	CGGACUGA CUGAUGAG X CGAA ICCCAUC	3383
655	AATGGGCC C CATGCTGT	875	ACGACUGA CUGAUGAG X CGAA IGGCCACU	3384
657	TGGGCCCT C GTCCGTTT	876	AAACGGAC CUGAUGAG X CGAA IAGGCCCA	3385
661	CCTCAGTC C GTTCTCTT	877	AGAGAAAC CUGAUGAG X CGAA IACUGAGG	3386
667	TCTGTTTC T CTTGGCTC	878	GAGCCAAG CUGAUGAG X CGAA TAAACGGA	3387
669	CGTTTCTC T TGGCTCAG	879	CUGAGCCA CUGAUGAG X CGAA IAGAAACG	3388
674	CTCTTGGC C CAGTTTAC	880	GUAAACUG CUGAUGAG X CGAA ICCAAGAG	3389
676	CTTGGCTC A GTTACTA	881	UAGUAAAC CUGAUGAG X CGAA IAGCCAAG	3390
683	CAGTTTAC T AGTGCCAT	882	AUGGCACU CUGAUGAG X CGAA IUAAACUG	3391
689	ACTAGTGC C ATTGTGTC	883	GAACAAAU CUGAUGAG X CGAA ICACUAGU	3392
690	CTAGTGCC A TTTGTTCA	884	UGAACAAA CUGAUGAG X CGAA IGCACUAG	3393
698	ATTGTGTC A GTGGTTG	885	CGAACAC CUGAUGAG X CGAA IAACAAAU	3394
713	CGTAGGTC T TTCCCCCA	886	UGGGGGAA CUGAUGAG X CGAA ICCCUACG	3395
717	GGGCTTTC C CCACTGTG	887	ACAGUUGG CUGAUGAG X CGAA IAAAGCCC	3396
718	GGCTTTTC C CCACTGTC	888	GACAGUGG CUGAUGAG X CGAA IGAAAGCC	3397
719	GCTTTCCC C CACTGTCT	889	AGACAGUG CUGAUGAG X CGAA IGGAAAGC	3398
720	CTTTCCCC C ACTGTCTG	890	CAGACAGU CUGAUGAG X CGAA IGGGAAAG	3399
721	TTTCCCCC A CTGTGCTG	891	CCAGACAG CUGAUGAG X CGAA IGGGAAAG	3400
723	TCCCCCAC T GTCTGGCT	892	AGCCAGAC CUGAUGAG X CGAA IGGGGAAG	3401
727	CCACTGTC T GGCCTTCA	893	UGAAAGCC CUGAUGAG X CGAA IACAGUGG	3402
731	TGCTGTC T TTAGGTTA	894	UAACUGAA CUGAUGAG X CGAA ICCAGACA	3403
735	TGCTTCTC A GTTATATG	895	CAUAUAC CUGAUGAG X CGAA IAAAGCCA	3404
764	TGGGGGCC C AAGTCTGT	896	ACAGACUU CUGAUGAG X CGAA ICCCCCAA	3405
765	TGGGGGCC A AGTCTGTA	897	UACAGACU CUGAUGAG X CGAA IGGCCCCA	3406
770	GCCAAATC T GTACAAAC	898	UGUUGUAC CUGAUGAG X CGAA IACUUGGC	3407
775	GTCTGTAC A ACATCTTG	899	CAAGAGUU CUGAUGAG X CGAA IUACAGAC	3408
778	TGTACAAAC A TCTTAGT	900	ACUCAAGA CUGAUGAG X CGAA IUUGUACA	3409
781	ACAACATC T TGAGTCCC	901	GGGACUCA CUGAUGAG X CGAA IAUUGUGU	3410

Table 38

788	CTTGAGTC C CTTTATGC	902	GCAUAAAG CUGAUGAG X CGAA IACUCAAG	3411
789	TTGAGTCC C TTTATGCC	903	GGCAUAAA CUGAUGAG X CGAA IGACUCA	3412
790	TGAGTCCC T TTAGTCCG	904	CGGCAUAA CUGAUGAG X CGAA IGGAUCUA	3413
797	CTTTATGC C GCTGTTAC	905	GUACACAG CUGAUGAG X CGAA ICAUAAAG	3414
800	TATGCCGC T GTTACCAA	906	UUGGUAA CUGAUGAG X CGAA ICGGCAUA	3415
806	GCTGTTAC C AATTTTCT	907	AGAAAUAU CUGAUGAG X CGAA IUAACAGC	3416
807	CTGTTACC A ATTTTCTT	908	AAGAAAUA CUGAUGAG X CGAA IGUUACAG	3417
814	CAATTTTC T TTTGCTCT	909	AAGACAAA CUGAUGAG X CGAA TAAAUUUG	3418
821	CTTTTGTC T TTGGGTAT	910	AUACCCAA CUGAUGAG X CGAA TACAAAAG	3419
832	GGGTATAC A TTTAAACC	911	GGUUUAAA CUGAUGAG X CGAA IUUAUCCC	3420
840	ATTTAAAC C CTCACAAA	912	UUUGUGAG CUGAUGAG X CGAA IUUUUAAU	3421
841	TTTAAACC C TCACAAAA	913	UUUGUGAG CUGAUGAG X CGAA IGUUAAUA	3422
842	TTAAACCC T CACAAAAA	914	GUUUUGUG CUGAUGAG X CGAA IGGUUUAA	3423
844	AAACCCCTC A CAAAACAA	915	UUUUUUUG CUGAUGAG X CGAA TAGGUUUU	3424
846	ACCCTCAC A AAACAAAA	916	UUUUUUUU CUGAUGAG X CGAA TUGAGGGU	3425
851	CACAAAC A AAAGATG	917	CAUCUUUU CUGAUGAG X CGAA IUUUUGUG	3426
869	GGATATTC C CTTAATTC	918	AAGUUAAG CUGAUGAG X CGAA IAAUAUCC	3427
870	GATATTCC C TTAACCTC	919	GAAGUUA CUGAUGAG X CGAA IGAAUAUC	3428
871	ATATTCCC T TAACTTCA	920	UGAAGUUA CUGAUGAG X CGAA TGGAAUUA	3429
876	CCCTTAACT T TCATGGGA	921	UCCCAUGA CUGAUGAG X CGAA TUUAAGGG	3430
879	TTAATCTC A TGGGATAT	922	AUAUCCCA CUGAUGAG X CGAA IGAUUAUA	3431
906	TTTGGGCG C CATTGCCA	923	UGGCAUUG CUGAUGAG X CGAA TCCCAAC	3432
908	TGGGGCAC A TTGCCACA	924	UGUGGCAA CUGAUGAG X CGAA TUGGCCCA	3433
913	CACATTGC C ACAGGAAC	925	GUUCCUGU CUGAUGAG X CGAA TCAAUUG	3434
914	ACATTGCC A CAGGAACA	926	UGUUCUGU CUGAUGAG X CGAA TGCAAUGU	3435
916	ATTGCCAC A GGAACATA	927	UAUUGUCC CUGAUGAG X CGAA TUGGCAUA	3436
922	ACAGGAAC A TATTGTAT	928	GUACAAUA CUGAUGAG X CGAA TUUCUGU	3437
931	TATTGTAT A AAAATACA	929	UGAUUUUU CUGAUGAG X CGAA IUACAAUA	3438
939	AAAAAATC A AAATGTGT	930	ACACAUUU CUGAUGAG X CGAA IAUUUUUU	3439
958	TAGGAATC T TCTGTAA	931	UUACAGGA CUGAUGAG X CGAA IUUUUCCA	3440
961	GAAACTTC C TGTAACAA	932	UGUUUACA CUGAUGAG X CGAA IAAUUAUU	3441
962	AACTTCTC T GTAAACAG	933	CUUUUUAC CUGAUGAG X CGAA IGAUUUUU	3442
969	CTGTAAAC A GGCCTATT	934	AAUAGGCC CUGAUGAG X CGAA IUUUACAG	3443
973	AAACAGGC C TATTGATT	935	AAUCAUA CUGAUGAG X CGAA TCCUUAUU	3444
974	AACAGGCC T ATTGATTG	936	CAUCRAU CUGAUGAG X CGAA TGCUGUUU	3445
994	AGTATGTC A ACGAATTG	937	CAAUUCGU CUGAUGAG X CGAA TACAUACU	3446
1009	TGTGGGTC T TTTGGGGT	938	ACCCCAAA CUGAUGAG X CGAA TACCCACA	3447
1022	GGGTTTGC C GCCCTTTT	939	AAAGGGGC CUGAUGAG X CGAA TCAAAACC	3448
1025	TTTGCCGC C CTTTTCAC	940	GUGAAAGG CUGAUGAG X CGAA TCGGCAAA	3449
1026	TTGCGGCC C CTTTCAAG	941	CGUGAAGG CUGAUGAG X CGAA TCGGCAAA	3450
1027	TGCGGCCC C TTTACAGC	942	GGUGGAAA CUGAUGAG X CGAA TGGGGGCA	3451
1028	GCCGCCCC T TTACGACA	943	UGCGUGAA CUGAUGAG X CGAA TGGCGGCG	3452
1032	CCCCTTTC A CGCAATGT	944	ACAUUGCG CUGAUGAG X CGAA TAAAGGGG	3453
1036	TTTCAAGC A ATGTGGAT	945	AUCCACAU CUGAUGAG X CGAA TGGUGAAA	3454
1049	GGATATTC T GCTTTAAT	946	AUUAAGCG CUGAUGAG X CGAA TAAUAUCC	3455
1052	TATCTGTC T TTAATGCC	947	GGCAUUUA CUGAUGAG X CGAA TCAUAUAU	3456
1060	TTTAATGC C TTTATATG	948	CAUAUAAA CUGAUGAG X CGAA TCAUUAUA	3457
1061	TTTATGCC T TTTATATG	949	GCAUAUAA CUGAUGAG X CGAA TCAUUAUA	3458
1070	TTTATATG A TGCATACA	950	UGUAUGCA CUGAUGAG X CGAA TCAUUAUA	3459
1074	ATGCATGC A TACAGACA	951	UGCUUGUA CUGAUGAG X CGAA TCAUGCAU	3460
1078	ATGCATAC A AGCAAAAC	952	GUUUUGCU CUGAUGAG X CGAA TUAUGCAU	3461

Table 38

1082	ATACAAGC A AAACAGGC	953	GCCUGUUU CUGAUGAG X CGAA ICUUGUAU	3462
1087	AGCAAAAC A GGCCTTTA	954	UAAAAGCC CUGAUGAG X CGAA IUUUGUCU	3463
1091	AAACAGGC T TTTACTTT	955	AAAGUAAA CUGAUGAG X CGAA ICCUGUUU	3464
1097	GCCTTTAC T TTCTCGCC	956	GGCGAGAA CUGAUGAG X CGAA IUAAAAGC	3465
1101	TTACTTTC T CGCAACT	957	AGUJGGCG CUGAUGAG X CGAA TAAAGUAA	3466
1105	TTTCTGCG C AACTTACA	958	UGUAAGUU CUGAUGAG X CGAA ICGAGAAA	3467
1106	TTCTCGCC A ACTTACAA	959	UUGUAAGU CUGAUGAG X CGAA ICGGAGAA	3468
1109	TCGCCAAC T TACAAGCG	960	GCCUUGUA CUGAUGAG X CGAA IUUGGCGA	3469
1113	CACTTTAC A AGGCCTTT	961	AAAGGCCU CUGAUGAG X CGAA IUUAGUUG	3470
1118	TACAAGGC C TTCTTAAG	962	CUUAGAAA CUGAUGAG X CGAA TCCUUGUA	3471
1119	ACAAGGCC T TTCTAAGT	963	ACUUGAAA CUGAUGAG X CGAA IGCUGUUG	3472
1123	GGCCTTTC T AAGTAAAC	964	GUUUAUUU CUGAUGAG X CGAA IAAAGGCC	3473
1132	AAGTAAC A GTATGTGA	965	UCCAUUAC CUGAUGAG X CGAA IUUUUAUU	3474
1143	ATGTGAAC C TTTACCCC	966	GGGUUAAA CUGAUGAG X CGAA IUUUCACU	3475
1144	TGTGAACC C TTACCCCG	967	CGGGGUAA CUGAUGAG X CGAA IGUUCCAC	3476
1149	ACCTTTAC C CGTGTGCT	968	AGCAACGG CUGAUGAG X CGAA IUAAAAGG	3477
1150	CCCTTACC C CGTTGCTC	969	GAGCAACG CUGAUGAG X CGAA IGUAAAAG	3478
1151	CTTTACCC C GTTGCTCG	970	CGAGCAAC CUGAUGAG X CGAA IGUUAAAG	3479
1157	CCGCTTGC T CGGCAAGC	971	CGUUGCCG CUGAUGAG X CGAA ICAACGGG	3480
1162	TGCTGGGC A ACGGCGTG	972	CAGGCGGU CUGAUGAG X CGAA ICCGAGCA	3481
1168	GCAAGGCC C TGGTCTAT	973	AUAGACCA CUGAUGAG X CGAA ICCUGUCC	3482
1169	CAACGGGC A TGGTCTAT	974	CAUAGACC CUGAUGAG X CGAA ICGCGUUG	3483
1174	GCCTGGTC T ATGCCAAG	975	CUUGGCAU CUGAUGAG X CGAA IACCAGGC	3484
1179	GCTATGTC C AAGTGTTT	976	AAACACUU CUGAUGAG X CGAA IGCAUAGA	3485
1180	TCATGACC A AGTGTTT	977	CAAAACUU CUGAUGAG X CGAA IGCAUAGA	3486
1190	GTGTTTGC T GACGCAAC	978	GUUGCGUC CUGAUGAG X CGAA ICAAAACAC	3487
1196	GCTGACGC A ACCGCCAC	979	GUGGGGUU CUGAUGAG X CGAA ICGUCAGC	3488
1199	GACGCAAC C CCCACTGG	980	CCAGUGGG CUGAUGAG X CGAA IUUGCGUC	3489
1200	ACGCAACC C CCACTGGT	981	ACCAGUGG CUGAUGAG X CGAA IGUGCGU	3490
1201	CGCAACCC C CACTGGTT	982	AACCAGUG CUGAUGAG X CGAA IGGUUGCG	3491
1202	GCAACCCC C ACTGGTTC	983	CAACCAAG CUGAUGAG X CGAA IGGUUGCG	3492
1203	CAACCCCC A CTGGTTGG	984	CCAACCAAG CUGAUGAG X CGAA IGGUUGCG	3493
1205	ACCCCCAC T GGTGGGGG	985	CCCCAAC CUGAUGAG X CGAA IUGGGGGU	3494
1215	GTGGGGGC T TGGCCATA	986	UAUUGGCA CUGAUGAG X CGAA ICCCAAC	3495
1220	GGCTGGGC C ATAGGCCA	987	UGGCCUUA CUGAUGAG X CGAA ICCCAAC	3496
1221	GCTGGGCC A TAGGCAT	988	AUGGCCUA CUGAUGAG X CGAA IGCCAAGC	3497
1227	CCATAGGC C ATCAGCGC	989	GGCGUGAU CUGAUGAG X CGAA ICGUUAUG	3498
1228	CATAGGCC A TCAGGCCA	990	UGCGUGUA CUGAUGAG X CGAA ICGUUAUG	3499
1231	AGGCCATC A GCGCATGC	991	GCAUGGCC CUGAUGAG X CGAA IAGUGGUU	3500
1236	ATCAGCGC C ATAGGCCA	992	UCCACGCA CUGAUGAG X CGAA ICGUGUUA	3501
1247	CGTGGAAC C TTGTGTCT	993	GACACAAA CUGAUGAG X CGAA IUUUCACG	3502
1248	TTGGAACC T TTGTGTCT	994	AGACACAA CUGAUGAG X CGAA IUGUCCAC	3503
1256	TTGTGTCT C CTTGTGCC	995	GGCAGAGG CUGAUGAG X CGAA TACACAAA	3504
1258	TGTGTCTC C TGTGCCGA	996	UCGGCAGA CUGAUGAG X CGAA IAGACACA	3505
1259	GTGTCTCC T CTGCGGAT	997	AUCCGCGG CUGAUGAG X CGAA IAGACACG	3506
1261	GTCTCTCT C GCGGATCC	998	GGAUCGCG CUGAUGAG X CGAA IAGGAGAG	3507
1264	TCCTCTGC C ATACCATC	999	UAUGGAUC CUGAUGAG X CGAA ICAGAGGA	3508
1269	TGCGCATC C GATACCGG	1000	CGCGGUAU CUGAUGAG X CGAA TAUUGGCA	3509
1270	GCGGATCC A TACCGCGG	1001	CCGCGGUA CUGAUGAG X CGAA IAGAGCGG	3510
1274	ATCCATAC C GCGGAATC	1002	AGUUCGCG CUGAUGAG X CGAA IUAUGGAU	3511
1282	GCGGGAAC T CTTAGCCG	1003	CGGCUAGG CUGAUGAG X CGAA IUUCGCGG	3512

Table 38

1284	CGGAATCTC	C	TAGCCGCT	1004	AGCGGCUA	CUGAUGAG	X	CGAA	IAGUUCGG	3513
1285	GGAACTCC	T	AGCCGCTT	1005	AAGCGGCU	CUGAUGAG	X	CGAA	IGAGUUC	3514
1289	CTCCTAGC	C	GCTTGT	1006	AAACAAGC	CUGAUGAG	X	CGAA	ICUAGGAG	3515
1292	CTAGCCGC	T	TGTTTTC	1007	GCAAAACA	CUGAUGAG	X	CGAA	ICGGCUAG	3516
1301	TGTTTTC	T	CGCAGCAG	1008	CUCGUGCG	CUGAUGAG	X	CGAA	ICAAAACA	3517
1305	TTGCTCGC	A	CAGGTTCT	1009	AGACCUGC	CUGAUGAG	X	CGAA	ICGAGCAA	3518
1308	CTCCGAGC	A	GTCTGGG	1010	CCCAGACC	CUGAUGAG	X	CGAA	ICUGCGAG	3519
1313	AGCAGGTC	T	GGGCAAA	1011	UUUGCCCC	CUGAUGAG	X	CGAA	IACCUGCU	3520
1319	TCTGGGCG	A	AAATCAT	1012	AUGAGUUU	CUGAUGAG	X	CGAA	ICCCCCAG	3521
1324	GGCAAAAC	T	CATCGGGA	1013	UCCCGAUG	CUGAUGAG	X	CGAA	IUUUUGCC	3522
1326	CAAAATCT	A	TCCGGGAT	1014	AGUCCCGA	CUGAUGAG	X	CGAA	IAGUUUUG	3523
1334	ATCGGGAC	T	GACAATTC	1015	GAAUUGUC	CUGAUGAG	X	CGAA	IUCCCGAU	3524
1338	GGACTGAC	A	ATTCTGTC	1016	GACAGAAU	CUGAUGAG	X	CGAA	IUCAGUCC	3525
1343	GCAATTC	T	GTCTGTCT	1017	AGCACGAC	CUGAUGAG	X	CGAA	IAAUUGUC	3526
1351	TGCTGCTC	T	CCGCGCA	1018	UGCGGGAG	CUGAUGAG	X	CGAA	ICACGACA	3527
1353	TCTGTCTC	T	CCCGCAA	1019	UUUGCGGG	CUGAUGAG	X	CGAA	IAGCAGCA	3528
1355	GTGCTCTC	C	CGCAATA	1020	UAUUUGCG	CUGAUGAG	X	CGAA	IAGAGCAC	3529
1356	TGCTCTCC	C	GCAATAT	1021	AUAUUUGC	CUGAUGAG	X	CGAA	IGAGAGCA	3530
1359	TCTCCCGC	A	AATATACA	1022	UGUAUUAU	CUGAUGAG	X	CGAA	ICGGGAGA	3531
1367	AAATATAC	A	TCAATTC	1023	GGAAUAGA	CUGAUGAG	X	CGAA	IUAUUUUU	3532
1370	TATACATC	A	TTTCCATC	1024	CAUGGAAA	CUGAUGAG	X	CGAA	IAUGUAUA	3533
1375	ATCATTTC	C	ATGGCTGC	1025	GCAGCCAU	CUGAUGAG	X	CGAA	IAAAUGAU	3534
1376	TCATTTC	A	TGGCTGCT	1026	AGCAGCCA	CUGAUGAG	X	CGAA	IGAAUGA	3535
1381	TCCATGGC	T	GCTAGGCT	1027	AGCCUAGC	CUGAUGAG	X	CGAA	ICCAUGGA	3536
1384	ATGGCTGC	T	AGCTGTGT	1028	CACAGCCU	CUGAUGAG	X	CGAA	ICAGCCAU	3537
1389	TGCTAGGC	T	GTGCTGCC	1029	GCAGCAGC	CUGAUGAG	X	CGAA	ICCUAGCA	3538
1394	GGCTGTGC	T	GCCAACTG	1030	CAGUUGGC	CUGAUGAG	X	CGAA	ICACAGCC	3539
1397	TGTGCTGC	C	AACTGGAT	1031	AUCCAGAU	CUGAUGAG	X	CGAA	ICAGCACA	3540
1398	GTGCTGCC	A	ACTGGATC	1032	GAUCCAGU	CUGAUGAG	X	CGAA	ICAGCAGC	3541
1401	CTGCCAAC	T	GATCCCTA	1033	UAGGAUCC	CUGAUGAG	X	CGAA	IUUGGCAG	3542
1407	ACTGGATC	C	TAGCGGG	1034	CCCGCGUA	CUGAUGAG	X	CGAA	IAUCCAGU	3543
1408	CTGGATTC	T	ACCGGGGA	1035	UCCCGCGU	CUGAUGAG	X	CGAA	IGAUCACG	3544
1421	GGAGCTTC	C	TTTGTTTA	1036	UAAACAAA	CUGAUGAG	X	CGAA	IACGUCCC	3545
1422	GGAGCTTC	T	TTGTTTAC	1037	GUAAACAA	CUGAUGAG	X	CGAA	IAGCUCCC	3546
1434	TTTACGTC	C	CGCGGGG	1038	CGCCGACG	CUGAUGAG	X	CGAA	IACGUAAA	3547
1435	TTACGTC	C	GTGCGGCG	1039	GGCGCGAC	CUGAUGAG	X	CGAA	IAGCUAAA	3548
1444	GTGCGGCG	T	GAATCCCG	1040	CGGGAUUC	CUGAUGAG	X	CGAA	ICGCGGAC	3549
1450	GCTGAATC	C	CGCGGAGC	1041	CGUCCGCG	CUGAUGAG	X	CGAA	IAUUCAGC	3550
1451	CTGAATTC	C	GGCGGAGC	1042	UUGUCCGC	CUGAUGAG	X	CGAA	IGAUCAGC	3551
1461	CGAGGAGC	C	CGCGCGG	1043	CCGGGAGG	CUGAUGAG	X	CGAA	IUGGUCCG	3552
1462	GGAGGAGC	C	CTCCCGGG	1044	CCCGGGAG	CUGAUGAG	X	CGAA	IUGGUCCC	3553
1463	GAGGAGCC	C	TCCCGGGG	1045	CCCCGGGA	CUGAUGAG	X	CGAA	IUGUGGUC	3554
1464	AGGAGCCC	T	CCCGGGG	1046	CCCCCGGG	CUGAUGAG	X	CGAA	IGGUGGUC	3555
1466	GAGGAGCC	C	CGGGGGCG	1047	CGGCCCCG	CUGAUGAG	X	CGAA	IAGGGGUC	3556
1467	ACCCCTTC	C	GCTCCCGG	1048	CGGCCCCG	CUGAUGAG	X	CGAA	IAGGGGUG	3557
1473	CCCGGGGC	C	GCTTGGGG	1049	CCCCAAGC	CUGAUGAG	X	CGAA	ICCCCGGG	3558
1476	GGGGGGGC	T	TGGGGGCT	1050	GAGCCCCA	CUGAUGAG	X	CGAA	ICGGCCCC	3559
1483	CTTGGGGC	T	CTACGCCC	1051	GGCGGUAG	CUGAUGAG	X	CGAA	ICCCCCAG	3560
1485	TGGGGGCT	T	ACCGGCCG	1052	CGGGCGGU	CUGAUGAG	X	CGAA	IAGCCCCA	3561
1489	GGCTCTAC	C	GCCCGCTT	1053	AAGCGGGC	CUGAUGAG	X	CGAA	IUAGAGCC	3562
1491	TCTACCGC	C	CGCTTCTC	1054	GAGAAGCG	CUGAUGAG	X	CGAA	ICGGUAGA	3563

Table 38

1492	CTACCGCC	C	GCTTCTCC	1055	GGAGAAGC	CUGAUGAG	X	CGAA	IGCGGUAG	3564
1495	CGCGCCGC	T	TCTCGGCC	1056	GGCGGAGA	CUGAUGAG	X	CGAA	ICGGGCGG	3565
1498	CCCGCTTC	T	CCGCTTAT	1057	AUAGGCGG	CUGAUGAG	X	CGAA	IAGAGCGG	3566
1500	CGCTTCTC	C	GCTTATTT	1058	CAUAGGCG	CUGAUGAG	X	CGAA	IAGAAGCG	3567
1503	TCTTCCGC	C	TATTGTAC	1059	GUACAUAU	CUGAUGAG	X	CGAA	ICGGAGAA	3568
1504	TCTCGGCC	T	ATTGTACC	1060	GGUACAUA	CUGAUGAG	X	CGAA	ICGGGAGA	3569
1512	TATTGTAC	C	GACCGTCC	1061	GGACGGUC	CUGAUGAG	X	CGAA	IUACGAUA	3570
1516	GTACCGAC	C	GTCCAGGG	1062	CCGUGGAC	CUGAUGAG	X	CGAA	IUGGGUAC	3571
1520	CGACCGTC	C	ACGGGGCG	1063	CGCCCCGU	CUGAUGAG	X	CGAA	IACGGUUG	3572
1521	GACCGTCC	A	CGGGGGCG	1064	GCGCCCCG	CUGAUGAG	X	CGAA	IGACGGUC	3573
1530	CGGGGGCC	A	CCTCTCTT	1065	AAGAGAGG	CUGAUGAG	X	CGAA	ICGGCCCG	3574
1532	GGGGCGAC	T	TCTCTTTA	1066	UAAAGAGA	CUGAUGAG	X	CGAA	IUGCGCCC	3575
1533	GGCGCACC	T	CTCTTTAC	1067	GUAAAGAG	CUGAUGAG	X	CGAA	IUGGCGCC	3576
1535	CGCACCCT	T	CTTTACGC	1068	GCGUAAAG	CUGAUGAG	X	CGAA	IAGGUGCG	3577
1537	CACCTCTC	T	TTACGGCG	1069	CCGGGUAA	CUGAUGAG	X	CGAA	IAGAGGUG	3578
1548	ACCGGGAC	T	CCCGGTCT	1070	AGACGGGG	CUGAUGAG	X	CGAA	IUGCGCGU	3579
1550	CGGACTCC	C	CGCTCTGT	1071	ACAGACGG	CUGAUGAG	X	CGAA	IAGUCCGC	3580
1551	CGGACTCC	C	CGCTCTGT	1072	CACAGACG	CUGAUGAG	X	CGAA	IAGUCCGC	3581
1552	GGACTCCC	C	GTCTGTGC	1073	GCACAGAC	CUGAUGAG	X	CGAA	IGGAGUCC	3582
1556	TCCCGCTC	T	GTGCTCTT	1074	GAAGGCGC	CUGAUGAG	X	CGAA	IACGGGGA	3583
1561	GTCTGTGC	C	TTCTCATC	1075	GAUGAGAA	CUGAUGAG	X	CGAA	ICACAGAC	3584
1562	TCCTGTGC	T	CTCATCTT	1076	AGAUGAGA	CUGAUGAG	X	CGAA	IGCAGAGA	3585
1565	GTGCTTTC	T	CATCTGCC	1077	GGCAGAGG	CUGAUGAG	X	CGAA	IAGGCGAC	3586
1567	GCCTTCTC	A	TCTGCGGG	1078	CCGGCAGA	CUGAUGAG	X	CGAA	IAGAAGGC	3587
1570	TTCTCATC	T	GCGGAGCC	1079	GGUCCGGC	CUGAUGAG	X	CGAA	IAGAGGAA	3588
1573	TCATCTGC	C	GGACCGTG	1080	CACGGUCC	CUGAUGAG	X	CGAA	ICAGAGUA	3589
1578	TGCGGGAC	C	GTGTGCAC	1081	GUGCACAC	CUGAUGAG	X	CGAA	IUGCGGCA	3590
1585	CCGTGTGC	A	CTTCGCTT	1082	AAGCGAAG	CUGAUGAG	X	CGAA	ICACACGG	3591
1587	GTGTGCAC	T	TGCTTTCA	1083	UGAAGCGA	CUGAUGAG	X	CGAA	IUGCACAC	3592
1592	CACCTTCG	T	TCACCTCT	1084	AGAAGUGA	CUGAUGAG	X	CGAA	ICGAAGUG	3593
1595	TTGCTTTC	A	CTCTGTCA	1085	UGCAGAGG	CUGAUGAG	X	CGAA	IAGCGGAA	3594
1597	CGCTTCAC	C	TCTGCACG	1086	CGUGCAGA	CUGAUGAG	X	CGAA	IUGAAGCG	3595
1598	GCTTCACC	T	CTGCACGT	1087	ACGUGCAG	CUGAUGAG	X	CGAA	IUGGAAAG	3596
1600	TCTCACCCT	T	CGACGTGG	1088	CGACGUGC	CUGAUGAG	X	CGAA	IAGGUGAA	3597
1603	ACCTCTGC	A	CGTCGCAT	1089	AUGCGACG	CUGAUGAG	X	CGAA	ICAGAGGU	3598
1610	CACGTGCG	A	TGGAGACC	1090	GGUCUCCA	CUGAUGAG	X	CGAA	ICGACGUG	3599
1618	ATGGAGAC	A	CCGTGAAC	1091	UUCACGGU	CUGAUGAG	X	CGAA	IUUCUCAA	3600
1619	TGGAGACC	A	CCGTGAAC	1092	GUUCACGG	CUGAUGAG	X	CGAA	IUGUCUCC	3601
1621	GAGACCCAC	C	GTGAACGC	1093	GCGUACAC	CUGAUGAG	X	CGAA	IUGGUCUC	3602
1630	GTGAACGC	C	CACAGGAA	1094	UUCUCUGG	CUGAUGAG	X	CGAA	IGUUCUCC	3603
1631	TGAAGCGC	C	ACAGGAAC	1095	GUUCUUGU	CUGAUGAG	X	CGAA	IGCGUCCA	3604
1632	GCACGCCC	A	CAGGAACC	1096	GCUUCUUG	CUGAUGAG	X	CGAA	IUGGUGUCC	3605
1634	ACGCCCCA	A	GGAAACCT	1097	CAGGUUCC	CUGAUGAG	X	CGAA	IUGGGCGU	3606
1640	ACAGGAAC	C	TGCCCAAG	1098	CUUGGGCA	CUGAUGAG	X	CGAA	IUUCUUGU	3607
1641	CAGGAACC	T	GCCCAAGG	1099	CCUUGGGC	CUGAUGAG	X	CGAA	IGUUCUUG	3608
1644	GAACCTGC	C	CAAGTCTT	1100	AGACCUUG	CUGAUGAG	X	CGAA	ICAGGUUC	3609
1645	AACCTGCC	C	AAGCTCTT	1101	AAGACCUU	CUGAUGAG	X	CGAA	IGCGAGUU	3610
1646	ACCTGCCC	A	AGGTCTTG	1102	CAAGACCU	CUGAUGAG	X	CGAA	IGCGAGUU	3611
1652	CGAAGGTC	T	TGCATAAG	1103	CUUAUGCA	CUGAUGAG	X	CGAA	IACCUUGG	3612
1656	GGTCTTGC	A	TAAAGAGA	1104	UUCUCUUA	CUGAUGAG	X	CGAA	ICAAAGCC	3613
1666	AAGAGGAT	T	CTTGACCT	1105	AGUCCAAG	CUGAUGAG	X	CGAA	IUUCUCUU	3614

Table 38

1668	GAGGACTC T TGGACTTT	1106	AAAGUCCA CUGAUGAG X CGAA IAGUCCUC	3615
1674	TCTTGGAC T TTCAGCAA	1107	UUGCUGAA CUGAUGAG X CGAA IUCCAGA	3616
1678	GGACTTTC A GCAATGTC	1108	GACAUUGC CUGAUGAG X CGAA IAAAGUCC	3617
1681	CTTTGAGC A ATGTCAAC	1109	GUUGACAU CUGAUGAG X CGAA ICUGAAAG	3618
1687	GCAATGTC A AGTACCGA	1110	UCGUGUGU CUGAUGAG X CGAA IACAUUGC	3619
1693	TCACGAC C GACCTTGA	1111	UCAAGGUC CUGAUGAG X CGAA IUCGUUGA	3620
1697	CGACCGAC C TTGAGGCA	1112	UGCCUCAA CUGAUGAG X CGAA IUCGUGUC	3621
1698	GACCAGCC T TGAGGCAT	1113	AUGCCUCA CUGAUGAG X CGAA IUGCGUUC	3622
1705	CTTGAGGC A TACTTCAA	1114	UUGAAGUA CUGAUGAG X CGAA ICCUCAAG	3623
1709	AGGCATAC T TCAAGAC	1115	GUCUUUGA CUGAUGAG X CGAA IUAUGCCU	3624
1712	CATACCTC A AAGACTGT	1116	ACAGUCUU CUGAUGAG X CGAA IAGUAUUG	3625
1718	TCAAAGAC T GTGTGTTT	1117	AAACACAC CUGAUGAG X CGAA IUCUUUGA	3626
1769	TAAAGGTC T TTGTACTA	1118	UAGUACAA CUGAUGAG X CGAA IACCUUUA	3627
1776	CTTTGTAC T AGGAGGCT	1119	AGCCUCCU CUGAUGAG X CGAA IUACAAAG	3628
1784	TAGGAGGC T GTAGGCAT	1120	AUGCCUAC CUGAUGAG X CGAA ICCUCCUA	3629
1791	CTGTAGGC A TAAATGCG	1121	CCAUAUUA CUGAUGAG X CGAA ICCUACAG	3630
1807	GTGTGTTT A CCAAGCAC	1122	GGUGCUGG CUGAUGAG X CGAA IACACAC	3631
1809	GTGTTCAC C AGCACCAT	1123	AUGGUGCU CUGAUGAG X CGAA IUGAACAC	3632
1810	TGTTCAAC A GCACCATG	1124	CAUGGUGC CUGAUGAG X CGAA IUGAACAC	3633
1813	TCACCAGC A CCATGCAA	1125	UUGCAUGG CUGAUGAG X CGAA IUCGUGUA	3634
1815	ACCAGCAC C ATGCAACT	1126	AGUUGCAU CUGAUGAG X CGAA IUGCUGGU	3635
1816	CCAGCAC C TGCAACTT	1127	AAGUUGCA CUGAUGAG X CGAA IUGCUGGU	3636
1820	CACCATGC A ACTTTTTT	1128	GAAAAAGU CUGAUGAG X CGAA ICAUGGUG	3637
1823	CATGCAAC T TTTTCACC	1129	GGUGAUAU CUGAUGAG X CGAA IUUGCAUG	3638
1829	ACTTTTTT A CCTCTGCC	1130	GGCAGAGG CUGAUGAG X CGAA IAAAAAGU	3639
1831	TTTTTCAC C TCTGCTTA	1131	UAGGCAGA CUGAUGAG X CGAA IUGAAAAA	3640
1832	TTTTCAAC T CCGCTAA	1132	UUAGGCAG CUGAUGAG X CGAA IUGAAAAA	3641
1834	TTCACTTC T GCTAATC	1133	GAUUAAGC CUGAUGAG X CGAA IAGGUGAA	3642
1837	ACCTCTGC C TAATCATC	1134	GAUGAUUA CUGAUGAG X CGAA ICAGAGGU	3643
1838	CCTCTGCC T AATCATCT	1135	AGAUGAUU CUGAUGAG X CGAA TGCAGAGG	3644
1843	GCCTAATC A TCTCATGT	1136	ACAUGAGA CUGAUGAG X CGAA IAUUAGGC	3645
1846	TAATCATC T CATGTTCA	1137	UGAACAUU CUGAUGAG X CGAA IAUUGAUU	3646
1848	ATCATCTC A TGTTCATG	1138	CAUGAACU CUGAUGAG X CGAA IAGAUGAU	3647
1854	TCATGTTC A TGTCTCAT	1139	GUAGGACA CUGAUGAG X CGAA IAACAUGA	3648
1859	TTGATGTC C TACTGTTT	1140	GAACAGUA CUGAUGAG X CGAA IACAUGAA	3649
1860	TCATGTTC T ACTGTTTA	1141	UGAACAGU CUGAUGAG X CGAA IGACAUGA	3650
1863	TGCTCTAC T GTTCAAGC	1142	CGUUGAAC CUGAUGAG X CGAA IUGAGCAA	3651
1868	TACTGTTT A AGCCTCCA	1143	UGAGGAGU CUGAUGAG X CGAA IAACAGUA	3652
1872	GTTCAAGC C TCCAAGCT	1144	AGCUUGGA CUGAUGAG X CGAA ICUGAAC	3653
1873	TTCAAGCC T CCAAGCTG	1145	CAGCUUGG CUGAUGAG X CGAA IGCUGUAA	3654
1875	CACAGCTC C AAGCTGTG	1146	CACAGCUU CUGAUGAG X CGAA IAGGCUUG	3655
1876	AAGCCTCC A AGCTGTGC	1147	GCACAGCU CUGAUGAG X CGAA IAGGCUUU	3656
1880	CTCCAAGC T GTGCCTTG	1148	CAAGGCAC CUGAUGAG X CGAA ICUGGAGG	3657
1885	AGCTGTGC C TTGGGTGG	1149	CCACCCAA CUGAUGAG X CGAA ICACAGCU	3658
1886	GCTGTGCC T TGGGTGGC	1150	GCCACCCA CUGAUGAG X CGAA IGCACAGC	3659
1895	TGGTGGCC T TTGGGGCA	1151	UGCCCCAA CUGAUGAG X CGAA ICCACCCA	3660
1903	TTTGGGCG A TGGACATT	1152	AAUGUCCA CUGAUGAG X CGAA ICCCCAAA	3661
1909	GCAATGAC A TTGACCGG	1153	CGGGUCAA CUGAUGAG X CGAA IUCCAUUC	3662
1915	ACATTGAC C CGTATTAAG	1154	UUUAUAGC CUGAUGAG X CGAA IUCAUUGU	3663
1916	CATTGACC C GTATAAAG	1155	CUUUAUAC CUGAUGAG X CGAA IUGCAUUG	3664
1935	TTTGGAGC T TCTGTGGA	1156	UCCACAGA CUGAUGAG X CGAA IUCCCAAA	3665

Table 38

1938	GGAGCTTC	T	GTGGAGTT	1157	AACUCCAC	CUGAUGAG	X	CGAA	IAAGCUCC	3666
1949	GGAGTTAC	T	CTCTTTT	1158	AAAAAAG	CUGAUGAG	X	CGAA	IUAACUCC	3667
1951	AGTTACTC	T	CTTTTTTG	1159	CAAAAAG	CUGAUGAG	X	CGAA	IAGUAACU	3668
1953	TTACTCTC	T	TTTTTGCC	1160	GGCAAAA	CUGAUGAG	X	CGAA	IAGAGUAA	3669
1961	TTTTTTGC	C	TCTGACT	1161	AGUCAGAA	CUGAUGAG	X	CGAA	ICAAAAAA	3670
1962	TTTTTGCC	T	TCTGACT	1162	AAGUCAGA	CUGAUGAG	X	CGAA	IGCAAAAA	3671
1965	TTGCCTTC	T	GACTCTCT	1163	AAGAAGUC	CUGAUGAG	X	CGAA	IAAGGCCA	3672
1969	CTCTGTAC	T	TCTTTCT	1164	AGGAAGAA	CUGAUGAG	X	CGAA	IUCAGAG	3673
1972	CTGACTTC	T	TTCTTTCT	1165	AGAAGGAA	CUGAUGAG	X	CGAA	IAAGUCAG	3674
1976	CTCTTTTC	C	TCTATTCT	1166	GAAUAGAA	CUGAUGAG	X	CGAA	IAAAGAG	3675
1977	TTCTTTCC	T	TCTATTGC	1167	CGAAUAGA	CUGAUGAG	X	CGAA	IGAAAGAA	3676
1980	TTTCTTTC	T	ATTGCGAA	1168	UCUCGAU	CUGAUGAG	X	CGAA	IAAGGAAA	3677
1991	TCGAGATC	T	CCTCGACA	1169	UGUCGAGG	CUGAUGAG	X	CGAA	IAUCUCGA	3678
1993	GAGATCTC	C	TCGACACC	1170	GGGUCGA	CUGAUGAG	X	CGAA	IAGAUCUC	3679
1994	AGATCTCC	T	CCGACCCG	1171	CGGUGUCG	CUGAUGAG	X	CGAA	IGAGAUCU	3680
1999	TCCTCGAC	A	CCGCTCT	1172	AGAGCGCG	CUGAUGAG	X	CGAA	IUCGAGGA	3681
2001	CTCGACAC	A	CGCTCTGC	1173	CGAGAGGC	CUGAUGAG	X	CGAA	IUGUCGAG	3682
2004	GACACCGC	C	CTGCTCT	1174	AGAGCAGA	CUGAUGAG	X	CGAA	ICGGUGUC	3683
2005	ACACCGCC	T	CTGCTCTG	1175	CAGAGCAG	CUGAUGAG	X	CGAA	ICGGUGUG	3684
2007	ACCGCTTC	T	GCTCTGTA	1176	UACAGAGC	CUGAUGAG	X	CGAA	IAGGCGUG	3685
2010	GCCTCTGC	T	CTGTATCG	1177	CGAAUACG	CUGAUGAG	X	CGAA	ICAGAGGC	3686
2012	CTCTCTCT	T	ATTGCGGG	1178	CCCGAUA	CUGAUGAG	X	CGAA	IAGCAGAG	3687
2025	CGGGGGGC	C	TTAGAGTC	1179	GACUCUAA	CUGAUGAG	X	CGAA	ICCCCCCG	3688
2026	GGGGGGCC	T	TAGAGTCT	1180	AGACUCUA	CUGAUGAG	X	CGAA	ICCCCCCG	3689
2034	TTAGAGTC	T	CCGGAACA	1181	UGUUCGG	CUGAUGAG	X	CGAA	IACUCUAA	3690
2036	AGAGTCTC	C	GGAACATT	1182	AAUGUUC	CUGAUGAG	X	CGAA	IAGACUCU	3691
2042	TCCGGAAC	A	TTGTTTAC	1183	GUGAACAA	CUGAUGAG	X	CGAA	IUUCCGGA	3692
2049	CATTGTTT	A	CCTCACCA	1184	UGGUGAGG	CUGAUGAG	X	CGAA	IAACAAGU	3693
2051	TGTTTAC	C	TCACCATA	1185	UAUGGUGA	CUGAUGAG	X	CGAA	IUGAACAA	3694
2052	TGTTTAC	T	CACCATAC	1186	GUAUGGUG	CUGAUGAG	X	CGAA	IGUGAACAA	3695
2054	TTACCTAC	A	CCATACCG	1187	CCGUAUGG	CUGAUGAG	X	CGAA	IAGGUGAA	3696
2056	CACCTCAC	C	ATACGGCA	1188	UGCCGUU	CUGAUGAG	X	CGAA	IUGAGGUG	3697
2057	ACCTCACC	A	TACGGCAC	1189	GUGCCGUA	CUGAUGAG	X	CGAA	IUGAGGUG	3698
2064	CATACGGC	A	CTCAGGCA	1190	UGCCUGAG	CUGAUGAG	X	CGAA	ICCGUAUG	3699
2066	TACGGCAC	T	CAGGCAAG	1191	CUUCCUG	CUGAUGAG	X	CGAA	IUGCCGUA	3700
2068	CGGCACCT	A	GGCAAGCT	1192	AGCUUCC	CUGAUGAG	X	CGAA	IAGUCCG	3701
2072	ACTCAAGC	A	AGCTATT	1193	GAAUAGCU	CUGAUGAG	X	CGAA	ICCUAGAU	3702
2076	AGGCAAGC	T	ATTCTGTG	1194	CACAGAAU	CUGAUGAG	X	CGAA	ICUGGCCU	3703
2081	AGCTATT	T	GTGTTGGG	1195	CCCAACAC	CUGAUGAG	X	CGAA	IAUAAGCU	3704
2105	GATGAATC	T	AGCCACT	1196	AGGUGGUC	CUGAUGAG	X	CGAA	IAUUAUC	3705
2109	AATCTAGC	C	ACCTGGGT	1197	ACCCAGGU	CUGAUGAG	X	CGAA	ICUAGAUU	3706
2110	ATCTAGCC	A	CCTGGGTG	1198	CACCCAGG	CUGAUGAG	X	CGAA	ICUAGAUU	3707
2112	CTAGCCAC	C	TGGGTGGG	1199	CCACCCCA	CUGAUGAG	X	CGAA	IUGGCUAG	3708
2113	TAGCCACC	T	GGGTGGGA	1200	UCCACCCC	CUGAUGAG	X	CGAA	IUGGCUAG	3709
2138	GGAAGATC	C	AGCATCCA	1201	UGGAUGUC	CUGAUGAG	X	CGAA	IAUUCUCC	3710
2139	GAGATGCC	A	GATCCAGC	1202	CUGGAUGC	CUGAUGAG	X	CGAA	IAUUCUCC	3711
2142	GATCCAGC	A	GCATCGGA	1203	UCCUGGGA	CUGAUGAG	X	CGAA	ICUGGAUC	3712
2145	CCAGCATC	C	AGGGAATT	1204	AAUUCUCC	CUGAUGAG	X	CGAA	IAUGGUGG	3713
2146	CAGCATCC	A	GGAATTTA	1205	AAUUCUCC	CUGAUGAG	X	CGAA	IAUGGUGG	3714
2161	TAGTAGTC	A	GCTATGTC	1206	GACAUAGC	CUGAUGAG	X	CGAA	ICUACUAA	3715
2164	TAGTCAGC	T	ATGTCAAC	1207	GUUGACAU	CUGAUGAG	X	CGAA	ICUGACUA	3716

Table 38

2170	GCTATGTC A ACGTTAAT	1208	AUUAACGU CUGAUGAG X CGAA IACAUAGC	3717
2185	ATATGGGC C TAAAAATC	1209	GAUUUUUA CUGAUGAG X CGAA TCCCAUUA	3718
2186	TATGGGCC T AAAAATCA	1210	UGAUUUUU CUGAUGAG X CGAA TGCCCAUA	3719
2194	TAAAAATC A GACAATA	1211	UAGUUGUC CUGAUGAG X CGAA TAUUUUUA	3720
2198	AATCAGAC A ACTATTGT	1212	ACAAUAGU CUGAUGAG X CGAA TUCUGAUU	3721
2201	CAGACAAC T ATTGTGTT	1213	ACCACAAU CUGAUGAG X CGAA TUUGUCUG	3722
2213	GTGGTTTC A CATTTCCT	1214	AGGAAUUG CUGAUGAG X CGAA TAAACCCAC	3723
2215	GGTTTCAC A TTCTCTGT	1215	ACAGGAAA CUGAUGAG X CGAA TUGAAACC	3724
2220	CACATTTC C TGCTTTAC	1216	GUAAGACA CUGAUGAG X CGAA TAAAGUG	3725
2221	ACATTTC T GTCTTACT	1217	AGUAAGAC CUGAUGAG X CGAA TGAUUUGU	3726
2225	TTCTTGTC T TACTTTTG	1218	CAAAAGUA CUGAUGAG X CGAA TACAGGAA	3727
2229	TGCTTTAC T TTTGGGCG	1219	CGCCCAAA CUGAUGAG X CGAA TAAAGACA	3728
2244	CGAGAATC T GTTCTTGA	1220	UCAGAAGA CUGAUGAG X CGAA TUUUUCUG	3729
2249	AACTGTTT C TGAATATT	1221	AAUAUUA CUGAUGAG X CGAA TAAAGUUA	3730
2265	TGTGTGTC T TTTGGAGT	1222	ACUCCAAA CUGAUGAG X CGAA TACACCAA	3731
2284	GGATTGCG A CTCCTCTC	1223	AGGAGGAG CUGAUGAG X CGAA TCGAUUCC	3732
2286	ATCGCTCC C TCTCTGCG	1224	CGAGGAGG CUGAUGAG X CGAA TUUGCAUA	3733
2288	TGCGACTC C TCTGTCAT	1225	AUGCAGGA CUGAUGAG X CGAA TAGUGCGA	3734
2289	CGCACTCC T CCTGTCAT	1226	UAUGCAGA CUGAUGAG X CGAA TGAUGGCG	3735
2291	CACCTCTC C TGCATATA	1227	UAUAUGCA CUGAUGAG X CGAA TAGGAGUG	3736
2292	ACTCTCTC T GCATATAG	1228	CUAUUAGC CUGAUGAG X CGAA TAGAGAGU	3737
2295	CCTCTCTC A ATATAGAG	1229	GGUCUAUA CUGAUGAG X CGAA TACAGAGG	3738
2303	ATATAGAC C ACCAAATG	1230	CAUUUGGU CUGAUGAG X CGAA TUUUAUAU	3739
2304	TATAGACC A CAAATATG	1231	GCAUUUGG CUGAUGAG X CGAA TUGUCUAU	3740
2306	TAGACCC C AATGCGCC	1232	GGGCAUUU CUGAUGAG X CGAA TUGGUCUA	3741
2307	AGACCAAC A AATGCGCC	1233	GGGGCAUU CUGAUGAG X CGAA TUGGUCUC	3742
2313	CCAAATGC C CCTATTCT	1234	AAGAUAAG CUGAUGAG X CGAA TCAUUUGG	3743
2314	CAAAATGC C CTATCTTA	1235	UAAGAUAU CUGAUGAG X CGAA TGAUUUGG	3744
2315	AAATGCCC C TATCTTAT	1236	AUAAGUAU CUGAUGAG X CGAA TGGCAUUU	3745
2316	AATGCCCC T ATCTTATC	1237	GAUAAGAU CUGAUGAG X CGAA TGGCAUUU	3746
2320	CCCCTATC T TATCAACA	1238	UGUUGUAU CUGAUGAG X CGAA TAUAGAGU	3747
2325	ATCTTATC A ACCTTCTC	1239	GGAAGUGU CUGAUGAG X CGAA TAUAGAGU	3748
2328	TTATCAAC A CTTCGGGA	1240	UCCGGAAG CUGAUGAG X CGAA TUUGAUAA	3749
2330	ATCAACAC T TCCGGAAA	1241	UUUCCGGA CUGAUGAG X CGAA TUUUGAUU	3750
2333	AACACTTC C GGAACATA	1242	UAGUUUCC CUGAUGAG X CGAA TAAUGUUU	3751
2340	CCGGAAAC T ACTGTGTT	1243	ACAACAGU CUGAUGAG X CGAA TUUUGCCG	3752
2343	GAAACTAC A CTGTGTTG	1244	CUAACAC CUGAUGAG X CGAA TUAUUUCC	3753
2362	GAAGAGGC A GGTCCCTC	1245	AGGGGACC CUGAUGAG X CGAA TCCUUCUC	3754
2367	GGCAGGTC C CTTAGAGA	1246	CUUUCUAG CUGAUGAG X CGAA TACUUGCC	3755
2368	GCAGGTCC C CTAGAGAA	1247	UCUUCUAG CUGAUGAG X CGAA TACUUGCC	3756
2369	CAGGTCCC C TAGAGAAA	1248	UUUUCUUA CUGAUGAG X CGAA TGAAGCCG	3757
2370	AGGTCCCC T AGAAGAA	1249	CUUUCUUC CUGAUGAG X CGAA TACUUGCC	3758
2382	AGAGAAC T CCCTCGCC	1250	GGCGAGGG CUGAUGAG X CGAA TUUUCUUC	3759
2384	AAAGACTC C CTGCGCTC	1251	GAGGCGAG CUGAUGAG X CGAA TAUUUCUU	3760
2385	AGAACTCC C TCGCTCTG	1252	CGAGGCGA CUGAUGAG X CGAA TGAUUCUU	3761
2386	GAATCTCC T CGCTCTGC	1253	CGAGGCGG CUGAUGAG X CGAA TGAUGUUC	3762
2390	TCCCTCGC C TCGCAGAC	1254	GUUCGCGA CUGAUGAG X CGAA TCGAGGGA	3763
2391	CCCTCGCC T CGCAGACG	1255	CGUCUGCG CUGAUGAG X CGAA TCGAGGGA	3764
2395	CGCTCTGC A GACGAAGG	1256	CGUUCGUC CUGAUGAG X CGAA TCGAGGCG	3765
2406	CGAAGGTC T CAATCGCC	1257	GGCGAUUG CUGAUGAG X CGAA TACUUGCC	3766
2408	AAGGTCTC A ATCGCGCG	1258	GGCGCGAU CUGAUGAG X CGAA TAGACCUU	3767

Table 38

2414	TCAATCGC	C	CGCTCGCA	1259	UGCGACGC	CUGAUGAG	X	CGAA	ICGAUGA	3768
2422	CGCGTCGC	A	GAAGATCT	1260	AGAUCUUC	CUGAUGAG	X	CGAA	ICGACGCG	3769
2430	AGAAGATC	T	CAATCTCG	1261	CGAGAUUG	CUGAUGAG	X	CGAA	IAUCUUCU	3770
2432	AAGATCTC	A	ATCTCGGG	1262	CCCGAGAU	CUGAUGAG	X	CGAA	TAGAUCU	3771
2436	TCTCAATC	T	CGGGAATC	1263	GAUJCCCG	CUGAUGAG	X	CGAA	IAUUGAGA	3772
2445	CGGGAATC	T	CAATGTTA	1264	UAACAUGU	CUGAUGAG	X	CGAA	IAUJCCCG	3773
2447	GGAACTCT	A	ATGTTAGT	1265	ACUAACAU	CUGAUGAG	X	CGAA	IAUAUCC	3774
2460	TAGTATTC	T	TTGGACAC	1266	GUUGUCAA	CUGAUGAG	X	CGAA	IAAUACUA	3775
2461	AGTATTC	T	TGGACACA	1267	UGUGUCAA	CUGAUGAG	X	CGAA	IGAAUACU	3776
2467	TCTTGGAC	A	CATAAGGT	1268	ACCUAUGU	CUGAUGAG	X	CGAA	IUCCAAGG	3777
2469	TTGGACAC	A	TAGGTGG	1269	CCACCUUA	CUGAUGAG	X	CGAA	IUGUCCAA	3778
2483	TGGGAAAC	T	TTACGGGG	1270	CCCCGUAA	CUGAUGAG	X	CGAA	IUUGCCCA	3779
2493	TACGGGGC	T	TTATCTTT	1271	AAGAUAUA	CUGAUGAG	X	CGAA	ICCCCGUA	3780
2500	CTTTATTC	T	TCCTAGGT	1272	ACCGUAGA	CUGAUGAG	X	CGAA	IAAUAAAG	3781
2503	TATCTTTC	T	ACGGTACC	1273	GGUACCGU	CUGAUGAG	X	CGAA	IAAGAAUA	3782
2511	TACGTATC	C	TTGCTTTA	1274	UAAAGCAA	CUGAUGAG	X	CGAA	IUACCCGU	3783
2512	ACGGTACC	T	TGCTTTAA	1275	UUAAGCAA	CUGAUGAG	X	CGAA	IUAUCCGU	3784
2516	TACCTTTC	T	TTATCTCT	1276	AGGAUUAU	CUGAUGAG	X	CGAA	ICAGGUA	3785
2523	CTTTATTC	T	TAAATGGC	1277	GCCAUUUA	CUGAUGAG	X	CGAA	IAUUAAG	3786
2524	TTTAATCC	T	AAATGGCA	1278	UGCCAUUU	CUGAUGAG	X	CGAA	IGAUUAAA	3787
2532	TAAATGGC	A	AACTCTCT	1279	AAGGAGUU	CUGAUGAG	X	CGAA	ICCAUUAU	3788
2536	TGGCAAA	T	CTCTCTTT	1280	AAAGAAGG	CUGAUGAG	X	CGAA	IUUGCCCA	3789
2538	GCAAACTC	C	TTCTTTTC	1281	GAAAAGAA	CUGAUGAG	X	CGAA	IAUUGUC	3790
2539	CAAACTCC	T	CTTTTTC	1282	GGAAAGAA	CUGAUGAG	X	CGAA	IGAGUUG	3791
2542	ACTCCTTC	T	TTCTCTGA	1283	UCAGGAAA	CUGAUGAG	X	CGAA	IAGGAGU	3792
2547	TTCTTTTC	C	TGACATTC	1284	GAUGUACA	CUGAUGAG	X	CGAA	IAAAAGAA	3793
2548	TCITTTTC	T	GACATTC	1285	UGAAUGUC	CUGAUGAG	X	CGAA	IGAAAAGA	3794
2552	TTCTTGAC	A	TTCAITTTG	1286	CAAAUGAA	CUGAUGAG	X	CGAA	IUCAGGAA	3795
2556	TGACATTC	A	TTTGCAGG	1287	CCUGCAAA	CUGAUGAG	X	CGAA	IAAUGUCA	3796
2562	TCATTTGC	A	GGAGGACA	1288	UGUCCUCC	CUGAUGAG	X	CGAA	ICAAAUUA	3797
2570	AGGAGGAC	A	TTGTTGAT	1289	AUCAACAA	CUGAUGAG	X	CGAA	IUCUCCU	3798
2589	ATGTAAGC	A	ATTTGTGG	1290	CCACAAAU	CUGAUGAG	X	CGAA	ICUUAACU	3799
2601	TGTGGGGC	C	CTTACAG	1291	CUGUAAGG	CUGAUGAG	X	CGAA	ICCCCA	3800
2602	TGTGGGGC	C	CTTACAGT	1292	ACUGUAGG	CUGAUGAG	X	CGAA	IGCCCCAC	3801
2603	TGGGGCCC	C	TTACAGTA	1293	UACUGUAA	CUGAUGAG	X	CGAA	IGGCCCCA	3802
2604	GGGGCCCC	T	TACAGTAA	1294	UTACUGUA	CUGAUGAG	X	CGAA	IGGGCCCC	3803
2608	CCCCTTAC	A	GTAATGAA	1295	UCAUUUAC	CUGAUGAG	X	CGAA	IUAGGGGG	3804
2621	ATGAAAC	A	GGAGACTT	1296	AGUCUCC	CUGAUGAG	X	CGAA	IUUUUAU	3805
2628	CAGGAGAC	T	TAAATTA	1297	UUAUUUUA	CUGAUGAG	X	CGAA	IUCUCCU	3806
2638	AAATTAAC	T	ATGCTGTC	1298	GCAGGCAU	CUGAUGAG	X	CGAA	IUAUAUU	3807
2643	AACTATGC	C	TGCTAGGT	1299	ACCUAGCA	CUGAUGAG	X	CGAA	ICAUAGU	3808
2644	ACTATGCC	T	GCTAGGTT	1300	AACCUAGC	CUGAUGAG	X	CGAA	IGCAUAGU	3809
2647	ATGCCTGC	T	AGGTTTAA	1301	UAAAACCU	CUGAUGAG	X	CGAA	ICAGGCAU	3810
2658	GTTTATTC	C	CAATGTTA	1302	UAACAUGU	CUGAUGAG	X	CGAA	IAUAAAAC	3811
2659	TTTATTC	C	AATGTTAC	1303	GUAACAUU	CUGAUGAG	X	CGAA	IGAUAAAA	3812
2660	TTATCCC	A	ATGTTACT	1304	AGUAACAU	CUGAUGAG	X	CGAA	IGGAUAAA	3813
2668	AATGTTAC	T	AAATATTT	1305	AAUAUUUU	CUGAUGAG	X	CGAA	IUAACUUU	3814
2679	ATATTTGC	C	CTTAGATA	1306	UAUCUAGG	CUGAUGAG	X	CGAA	ICAAAUUU	3815
2680	TATTTGCC	C	TAGATATA	1307	UAUUCUAA	CUGAUGAG	X	CGAA	IGCAAUUA	3816
2681	ATTTGCC	T	TAGATAAA	1308	UUUAUCUA	CUGAUGAG	X	CGAA	IGGCAAUU	3817
2696	AAGGGATC	A	ARCCGTAT	1309	AUACGGUU	CUGAUGAG	X	CGAA	IUCCUUU	3818

Table 38

2700	GATCAAC C GTATTATC	1310	GAUAAUAC CUGAUGAG X CGAA IUUUGAUC	3819
2709	GTATTATC C AGAGATATG	1311	CAUACUCU CUGAUGAG X CGAA IAUAAUAC	3820
2710	TATTATCC A GAGTATGT	1312	ACAUACUC CUGAUGAG X CGAA IGAUAAUA	3821
2727	AGTTAATC A TTACTTCC	1313	GGAAGUAA CUGAUGAG X CGAA IAUUAAU	3822
2732	ATCATTAC T TCACAGCG	1314	CGUCUGGA CUGAUGAG X CGAA TUAUAGAU	3823
2735	ATTACTTC C AGACGCGA	1315	UCGCGUCU CUGAUGAG X CGAA TAAAUAA	3824
2736	TTACTTCC A GACGCGAC	1316	GUCGCGUC CUGAUGAG X CGAA TGAUAAUA	3825
2745	GACGCGAC A TTATTATC	1317	GUAUAAUA CUGAUGAG X CGAA TUCGCGUC	3826
2754	TTATTATC A CACTCTTT	1318	AAAGAGUG CUGAUGAG X CGAA IUAAUAA	3827
2756	ATTACAC A CTCTTTGG	1319	CCAAAGAG CUGAUGAG X CGAA TUGUAAAU	3828
2758	TTACACAC T CTTTGGAA	1320	IUCCAAAG CUGAUGAG X CGAA TUGUGUAA	3829
2760	ACACACTC T TTGGAAGG	1321	CCUCCCAA CUGAUGAG X CGAA IAGUGUGU	3830
2777	CGGGATC T TATATAAA	1322	UUUAAUAA CUGAUGAG X CGAA TAUCCCG	3831
2794	AGAGAGTC C ACACGTAG	1323	CUACGUGU CUGAUGAG X CGAA IACUCUCU	3832
2795	GAGAGTCC A CAGTAGC	1324	GCUACGUG CUGAUGAG X CGAA IGACUCUC	3833
2797	GAGTCCAC A TCAAGCGC	1325	GCGCUACG CUGAUGAG X CGAA IUGGACUC	3834
2806	CGTAGCTC C TCATTTTG	1326	CAAAAUUA CUGAUGAG X CGAA ICGUACG	3835
2807	GTAGCGCC T CATTFTGC	1327	GCAAAUUG CUGAUGAG X CGAA IGCCTUAC	3836
2809	AGCGCTC A TTTTGGCG	1328	CCGCAAAA CUGAUGAG X CGAA IAGCGCGU	3837
2821	TGCGGTCC A CCATATTC	1329	GAUUAUUG CUGAUGAG X CGAA TACCCGCA	3838
2823	CGGTCCAC C ATATTCTT	1330	AAGAAUUA CUGAUGAG X CGAA TUGACCCG	3839
2824	GGGTCAAC A TATTTCTG	1331	CAAGAAUA CUGAUGAG X CGAA TUGUACCC	3840
2830	CCATATTC T TGGGAACA	1332	UGUCCCAA CUGAUGAG X CGAA TAAUUAUG	3841
2838	TTGGGAAC A AGATCTAC	1333	GUAGAUUU CUGAUGAG X CGAA IUUCCCAA	3842
2844	ACAAGATC T ACAGCATG	1334	CAUCGUGU CUGAUGAG X CGAA IAUUCUGU	3843
2847	AGATCTAC A GCATGGGA	1335	UCCCAUCC CUGAUGAG X CGAA TUGAUUCU	3844
2850	TCTACAGC A TGGGAGGT	1336	ACCUCCCA CUGAUGAG X CGAA TUGUAGA	3845
2864	GGTGTGTC T TCCAAACC	1337	GSUUGGGA CUGAUGAG X CGAA TACCAACC	3846
2867	TGTGCTTC C AAACCTCG	1338	CGAGGUUU CUGAUGAG X CGAA TAAAGCCA	3847
2868	GGTCTTCC A AACCTCGA	1339	UCGAGGUU CUGAUGAG X CGAA TGAAGACC	3848
2872	TTCCAAAC C TCAAAAAG	1340	CUUUUCGA CUGAUGAG X CGAA IUUUUGAA	3849
2873	TCCAAACC T CGAAAAGG	1341	CCUUUUCG CUGAUGAG X CGAA IGUUUGGA	3850
2883	GAAAAGGC A TGGGAGCA	1342	UGUCCCAA CUGAUGAG X CGAA ICCUUUUC	3851
2891	ATGGGGAC A AATCTTTC	1343	GAAAGAUU CUGAUGAG X CGAA IUCCCAA	3852
2896	GACAAATC T TTCTGTCC	1344	GGACAGAA CUGAUGAG X CGAA IAUUUGUC	3853
2900	AATCTTTC T GTCCCAAC	1345	UUGGGGAC CUGAUGAG X CGAA TAAAGAUU	3854
2904	TTCTGTGC C CCAATCCC	1346	GGGAUUGG CUGAUGAG X CGAA TACAGAAA	3855
2905	TTCTGTCC C CAATCCCC	1347	GGGGAUUG CUGAUGAG X CGAA TACAGAAA	3856
2906	TCTGTCCC C AATCCCCT	1348	AGGGGAUU CUGAUGAG X CGAA TGGACAGA	3857
2907	CTGTCCCC A ATCCCCG	1349	CAGGGGAU CUGAUGAG X CGAA TGGACAGC	3858
2911	CCCGCATC C CTTGGGAT	1350	AUCCCGAG CUGAUGAG X CGAA TAUUGGGG	3859
2912	CCCAATCC C CTGGGATT	1351	AAUCCCGA CUGAUGAG X CGAA TGAUUGGG	3860
2913	CCAATCCC C TGGGATTC	1352	GAAUCCCA CUGAUGAG X CGAA TGAUUGGG	3861
2914	CAATCCCC T GGGATTCT	1353	AGAAUCCC CUGAUGAG X CGAA TGGGAUUG	3862
2922	TGGGATTC T TCCCGATC	1354	AUCGGGGA CUGAUGAG X CGAA TAAUCCCA	3863
2925	GATTTCTC C CGGATCAT	1355	AUGAUCGG CUGAUGAG X CGAA TAAGAUUC	3864
2926	ATTCTTCC C CGATCATC	1356	GAUGAUCG CUGAUGAG X CGAA TGAAGAAU	3865
2927	TTCTTCCC C GATCATCA	1357	UGAUGAUC CUGAUGAG X CGAA TGGAGAAA	3866
2932	CCCGCATC A TCAGTTGG	1358	CCCAACUGA CUGAUGAG X CGAA TAUUGGGG	3867
2935	CGATCATC A GTGGACCC	1359	GGUCCCAAC CUGAUGAG X CGAA TAUUGAUCG	3868
2943	AGTTGGAC C CTGCATTC	1360	GAAUGCAG CUGAUGAG X CGAA TUCCAAUC	3869

Table 38

2944	GTGACC C TGCATTCA	1361	UGAAUGCA CUGAUGAG X CGAA IGUCCAAC	3870
2945	TTGGACCC T GCATTCAA	1362	UUGAAUGC CUGAUGAG X CGAA IGGUCCAA	3871
2946	GACCTG C TTTAAAGC	1363	GUUUGUUA CUGAUGAG X CGAA ICGAGGUC	3872
2952	CTGCAATC A AAGCCAAC	1364	GUUGGCUU CUGAUGAG X CGAA IAAUGCAG	3873
2957	TTCAAAGC C AACTCAGT	1365	ACUGAGUU CUGAUGAG X CGAA ICUUUGAA	3874
2958	TCAAAGCC A ACTCAGTA	1366	UACUGAGU CUGAUGAG X CGAA ITCUUGAA	3875
2961	AAGCCAAC T CAGTAAAT	1367	AUUUACUG CUGAUGAG X CGAA IUUGGCUU	3876
2963	GCCAACTC A GTAAATCC	1368	GGAUUUAU CUGAUGAG X CGAA IAGUUGGC	3877
2971	AGTAAATC C AGATTGGG	1369	CCCAAUUC CUGAUGAG X CGAA IGAUUUAC	3878
2972	GTAAATCC A GATTGGGA	1370	UCCCAAUC CUGAUGAG X CGAA IGAUUUAC	3879
2982	ATTGGGAC C TCAACCCG	1371	CGGUUGUA CUGAUGAG X CGAA IUCCCAAU	3880
2983	TTGGGACC T CAACCCGC	1372	GCUGGUUG CUGAUGAG X CGAA IUUGGCUU	3881
2985	GGGACCTC A ACCCGCAC	1373	GUGCGGUA CUGAUGAG X CGAA IAGGUCCC	3882
2988	ACCTCAAC C CGCACAGG	1374	CUUGUGUG CUGAUGAG X CGAA IUUGAGGU	3883
2989	CTCAACCC C CGACAGG	1375	CCUUGUGU CUGAUGAG X CGAA IGUUGAGG	3884
2992	CAACCCGC A CAGACACA	1376	UGUCCUUG CUGAUGAG X CGAA ICGGUUGU	3885
2994	ACCCGCAC T CAAGCCAC	1377	GUUGUCCU CUGAUGAG X CGAA IUGGCUUG	3886
3000	ACAAGGAC A ACTGGCCG	1378	CGGCCAGU CUGAUGAG X CGAA IUCCUUGU	3887
3003	AGGACAAC T GCGCGGAC	1379	GUGCCGCC CUGAUGAG X CGAA IUUGUCCU	3888
3007	CAACTGGC C GAGCGGCA	1380	UUGGCGUC CUGAUGAG X CGAA ICCAGUUG	3889
3014	CCGAGCGC C AACAGGTT	1381	ACCUUGUU CUGAUGAG X CGAA ICGUCCGG	3890
3015	CGGAGCGC A GGGTTTCA	1382	CACCUUGU CUGAUGAG X CGAA IUGGCGCG	3891
3018	ACGCCAAC A AGTGGGGA	1383	UCCCAUUC CUGAUGAG X CGAA IUUGGCGU	3892
3035	GTGGGAGC A TTGGGGCC	1384	GGCCCGAA CUGAUGAG X CGAA ITCUCCAC	3893
3043	ATTCCGGC C AGAGTTCA	1385	UGAACCCU CUGAUGAG X CGAA ICCCGAAU	3894
3044	TTCCGGCC C CCGTTTCA	1386	GUGAACCC CUGAUGAG X CGAA IGCCTGAA	3895
3051	CAGGGTTC A CCCTCCCC	1387	GCGAGGGG CUGAUGAG X CGAA IAACTCUG	3896
3053	GGGTTTAC C CTTCCCCA	1388	UGGGGAGG CUGAUGAG X CGAA IUGAACCC	3897
3054	GGTTCAAC C CTCCCATG	1389	AUGGGGAG CUGAUGAG X CGAA IUGUAACC	3898
3055	GTTTCAAC C TCCTCATG	1390	CAUGGGGA CUGAUGAG X CGAA IGGUGAAC	3899
3056	TTCAACCC T CCCCATGG	1391	CAUUGGGG CUGAUGAG X CGAA IGGUGGAA	3900
3058	CACCCCTC C CCATGGGG	1392	CCCAUUGG CUGAUGAG X CGAA IAGGGGUG	3901
3059	ACCCCTCC C CATGGGGG	1393	CCCCCAUG CUGAUGAG X CGAA IGAGGGGU	3902
3060	CCCTCTCC C ATGGGGGA	1394	UCCCCCAU CUGAUGAG X CGAA IGGAGGGG	3903
3061	CCCTCTCC A TGGGGGAC	1395	GUCCCCCA CUGAUGAG X CGAA IAGGGGGG	3904
3070	TGGGGGAC T GTTGGGCT	1396	ACCCCAAC CUGAUGAG X CGAA IUCCCCCA	3905
3084	GTTGGAGC C CTTCAGCT	1397	AGCGUGAG CUGAUGAG X CGAA IUCGACCC	3906
3085	GTGGAGCC C TCACGCTC	1398	GAGCGUGA CUGAUGAG X CGAA IGUCCAC	3907
3086	TGGAGCCC T CAGCTCA	1399	UGAGCGUG CUGAUGAG X CGAA IGCUCCA	3908
3088	GAGCGCTC A CGCTCAGG	1400	CCUGAGCG CUGAUGAG X CGAA IAGGCGUC	3909
3092	CCTCAGCG T CAGGCGCT	1401	AGGCCGUG CUGAUGAG X CGAA ICGUGAGG	3910
3094	TCACGCTC A GGGCTTAC	1402	GUAGGGCC CUGAUGAG X CGAA IAGCGUGA	3911
3099	CTCAGGGC C TACTCACA	1403	UGUGAGUA CUGAUGAG X CGAA ITCUUGAG	3912
3100	TCAGGGCC T ACTCACAA	1404	UUGUGAGU CUGAUGAG X CGAA IGCUCUGA	3913
3103	GGGCTTAC T CACAACGT	1405	CAGUUGUG CUGAUGAG X CGAA IAGGCGCC	3914
3105	GCCTACTC A CACTGTGT	1406	CACAGUUG CUGAUGAG X CGAA IAGUAGGC	3915
3107	CTACTCAC A ACTGTGCC	1407	GGCACAGU CUGAUGAG X CGAA IAGUGUAG	3916
3110	CTCACAA T GTCCAGC	1408	GUUGGAC CUGAUGAG X CGAA IUUGUGAG	3917
3115	AACTGTGC C AGCAGCTC	1409	GAGCUGUC CUGAUGAG X CGAA ICACAGUU	3918
3116	ACTGTGCC A CGAGCTCC	1410	GGAGCUGC CUGAUGAG X CGAA IGCACAGU	3919
3119	GTGCCAGC A GCTCTTCC	1411	GGAGGAGC CUGAUGAG X CGAA IUGGCGAC	3920

Table 38

3122	CCAGCAGC	T	CCTCCTCC	1412	GGAGGAGG	CUGAUGAG	X	CGAA	ICUGCUGG	3921
3124	AGCAGCTC	C	TCCTCCTG	1413	CAGGAGGA	CUGAUGAG	X	CGAA	IAGCUGCU	3922
3125	GCAGCTCC	T	CCTCCTGC	1414	GCAGGAGG	CUGAUGAG	X	CGAA	IAGCUGCG	3923
3127	AGCTCCTC	C	TCTTGCCT	1415	AGGCAGGA	CUGAUGAG	X	CGAA	IAGGAGCU	3924
3128	GCTCCTCC	T	CCTGCCTC	1416	GAGGCAGG	CUGAUGAG	X	CGAA	IGAGGAGC	3925
3130	TCCTCCTC	C	TGCTTCCA	1417	UGGAGGCA	CUGAUGAG	X	CGAA	IAGGAGGA	3926
3131	CCTCCTCC	T	GCCTCCAC	1418	GUGGAGGC	CUGAUGAG	X	CGAA	IGAGGAGG	3927
3134	CCTCCTGC	C	TCACACAA	1419	UUGGUGGA	CUGAUGAG	X	CGAA	ICAGGAGG	3928
3135	CTCCTGCC	T	CCACCAAT	1420	AUUGGUGG	CUGAUGAG	X	CGAA	IGCAGGAG	3929
3137	CCTGCCTC	C	ACCAATCG	1421	CGAUUGGU	CUGAUGAG	X	CGAA	IAGGAGG	3930
3138	CTGCCTCC	A	CCAATGGG	1422	CCGAUUGG	CUGAUGAG	X	CGAA	IGAGGCAG	3931
3140	GCCTCCAC	C	AATCGGCA	1423	UGCGGAUJ	CUGAUGAG	X	CGAA	IUGGAGGC	3932
3141	CCTCCACC	A	ATCGGCAG	1424	CUGCCGAU	CUGAUGAG	X	CGAA	IGUGGAGG	3933
3148	CAATCGGC	A	GTGAGGAA	1425	UUGCUGAC	CUGAUGAG	X	CGAA	ICCGAUUG	3934
3152	CGGCAGTC	A	GSAAGGCA	1426	UGCCUICC	CUGAUGAG	X	CGAA	IACUGCCG	3935
3160	AGGAAGGC	A	GCCTACTC	1427	GAGUAGGC	CUGAUGAG	X	CGAA	ICCUUCCU	3936
3163	AAGGCAGC	C	TACTCCTT	1428	AGGGAGUA	CUGAUGAG	X	CGAA	ICUGCCUU	3937
3164	AGGCAGCC	T	ACTCCCTT	1429	AAGGAGAU	CUGAUGAG	X	CGAA	IGCUGCCU	3938
3167	CAGCCTAC	T	CCCTTATC	1430	GAUAAAGG	CUGAUGAG	X	CGAA	IUAAGGUG	3939
3169	GCCTACTC	C	CTTATCTC	1431	GAGAUAA	CUGAUGAG	X	CGAA	IAGUAGGC	3940
3170	CCTACTCC	C	TTATCTCC	1432	GGAGAUAA	CUGAUGAG	X	CGAA	IGAGUAGG	3941
3171	CTACTCCC	T	TATCTCCA	1433	UGGAGAUJ	CUGAUGAG	X	CGAA	IGGAGUAG	3942
3176	CCCTTATC	T	CCACCTCT	1434	AGAGGUGG	CUGAUGAG	X	CGAA	IUAUAGG	3943
3178	CTTATCTC	C	ACCTCTAA	1435	UUGAGAGU	CUGAUGAG	X	CGAA	IUAUAAAG	3944
3179	TTATCTCC	A	CCCTTAAG	1436	CUUAGAGG	CUGAUGAG	X	CGAA	IGAGAUAA	3945
3181	ATCTCCAC	C	TCTAAGGC	1437	CCCUUAGA	CUGAUGAG	X	CGAA	IUGGAGAU	3946
3182	TCTCCACC	T	CTAAGGGA	1438	UCCCUUAG	CUGAUGAG	X	CGAA	IUGGAGAG	3947
3184	TCCACCTC	T	AAGGGACA	1439	UGUCCCUJ	CUGAUGAG	X	CGAA	IAGGUGGA	3948
3192	TAAGGGAC	A	CTCATCCT	1440	AGGAUGAG	CUGAUGAG	X	CGAA	IUCUUAAG	3949
3194	AGGGAGAC	T	CATCTCA	1441	UUGAGGAG	CUGAUGAG	X	CGAA	IUGUCCCU	3950
3196	GGACACTC	A	TCCTCAGG	1442	CCUGAGGA	CUGAUGAG	X	CGAA	IAGUGUCC	3951
3199	CACTCATC	C	TCAGGCCA	1443	UGGCCUGA	CUGAUGAG	X	CGAA	IAGUAGUG	3952
3200	ACTCATCC	T	CAGGCCAT	1444	AUGGCCUG	CUGAUGAG	X	CGAA	IAGUAGAU	3953
3202	TCTATCTC	A	GGCCATGC	1445	GCAUGGCC	CUGAUGAG	X	CGAA	IAGGAUGA	3954
3206	CCTCAGGC	C	ATGCAGTG	1446	CACUGCAU	CUGAUGAG	X	CGAA	ICUGGAGG	3955
3207	CTCAGGCC	A	TGCAGTGG	1447	CCAUGCA	CUGAUGAG	X	CGAA	IGCUGAG	3956

Input Sequence = AF100308. Cut Site = CH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCCUUAGGC or other stem II)

AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 39

Table 39: Human HBV G-cleaver Ribozyme and Substrate Sequence

Pos	Substrate	Seq ID	Ribozyme	Hz Seq ID
61	ACUUCUU G CUGGUGG	1448	GCACACG UGAUG GCAUGGACUAUAG GCG AGGAAAGU	3957
87	GGAAACAGU G AGCCUUC	1449	GCAGGCU UGAUG GCAUGGACUAUAG GCG ACUGUCC	3958
94	UGAGCCUU G CUGAGAU	1450	AUUCUAG UGAUG GCAUGGACUAUAG GCG AGGACUA	3959
112	CUGUCUU G CCUAUAG	1451	CGAUUAG UGAUG GCAUGGACUAUAG GCG AGAGACAG	3960
132	AUCUUAUC G AACGUGG	1452	CCGUCUU UGAUG GCAUGGACUAUAG GCG GAUAGAGU	3961
153	CCUGUACC G CACUUGA	1453	UCCAUUU UGAUG GCAUGGACUAUAG GCG GGUACAGG	3962
169	AGAACAU G CAUCAGG	1454	UCCUAGU UGAUG GCAUGGACUAUAG GCG GAUHUUC	3963
192	GGACCCUU G CUGUUUU	1455	AACAGAG UGAUG GCAUGGACUAUAG GCG AGGGUCC	3964
222	UUCUUGU G ACAAAGU	1456	AUUUUUU UGAUG GCAUGGACUAUAG GCG AACAGAA	3965
315	CAAAAUUC G CAGUCCA	1457	UGGACUG UGAUG GCAUGGACUAUAG GCG GAUUUUG	3966
374	UGUUAUC G CUGAGUU	1458	ACAUCAG UGAUG GCAUGGACUAUAG GCG GAUACCA	3967
387	AUGUUCU G CGAGUUU	1459	AAAGCGG UGAUG GCAUGGACUAUAG GCG AGACAU	3968
410	GUCCUUU G CAUCCUG	1460	CGAGUUG UGAUG GCAUGGACUAUAG GCG AGAGAGG	3969
417	UGUACUU G CUGUAUG	1461	CAUAGCAG UGAUG GCAUGGACUAUAG GCG AGAUUGA	3970
420	AUCCUUGU G CAUAGCU	1462	AGGCAUAG UGAUG GCAUGGACUAUAG GCG AGCAGAU	3971
425	GUUAGUU G CUUUAUU	1463	AGUAGAG UGAUG GCAUGGACUAUAG GCG AUAGCAG	3972
468	GUUAGUU G CCGUUUG	1464	CAAGCGG UGAUG GCAUGGACUAUAG GCG ACUAUCC	3973
518	CGACACU G CAAGACU	1465	AGUUUUU UGAUG GCAUGGACUAUAG GCG AUGUUUG	3974
527	CAAAACU G CACAAUC	1466	GAGUUUG UGAUG GCAUGGACUAUAG GCG AGUUUUU	3975
538	CAUUCUU G CUCAGAG	1467	UCCUAGU UGAUG GCAUGGACUAUAG GCG AGGAGUG	3976
569	CUGUUGU G CUGUACA	1468	UUUACAG UGAUG GCAUGGACUAUAG GCG AACAGUG	3977
596	CGAAACU G CACCUUA	1469	UACAGUG UGAUG GCAUGGACUAUAG GCG AGUUUUG	3978
631	GGGCUUC G CAAAUAC	1470	GUUUUUU UGAUG GCAUGGACUAUAG GCG GAAAGCC	3979
687	UUACUAGU G CAUUUUU	1471	ACAAUUG UGAUG GCAUGGACUAUAG GCG ACUAGUA	3980
747	AUAUGAU G AUUUGUU	1472	AACACAU UGAUG GCAUGGACUAUAG GCG AUCCAUU	3981
783	ACCAUUC G AGUCCUU	1473	AGGAGUG UGAUG GCAUGGACUAUAG GCG GAUUGUU	3982
795	CCUUUUU G CCGUUUU	1474	AAGACCG UGAUG GCAUGGACUAUAG GCG AUAAGGG	3983
798	UUUAUCC G CUAUACC	1475	GUUACAG UGAUG GCAUGGACUAUAG GCG GGCACAA	3984
911	GCACACU G CACAGAG	1476	UCCUUGG UGAUG GCAUGGACUAUAG GCG AUUUGCC	3985
978	GUUUUUU G AUUGAAA	1477	UUUCCAU UGAUG GCAUGGACUAUAG GCG AAUAGCC	3986

Table 39

997	AUTICAC	GAUUG	1478	CCACAUU	UGAUU	GCNUGCCAUUUC	GC	GUUGACAU	3987
1020	UGGUGUUU	GCGCCCUU	1479	AGGCGCG	UGAUU	GCNUGCCAUUUC	GC	AAACCCCA	3988
1023	GUUUUGCC	GCCUUUUC	1480	GAAGGGG	UGAUU	GCNUGCCAUUUC	GC	GGGAAACC	3989
1034	CUUUCUAC	GCAUUUUG	1481	CCACAUU	UGAUU	GCNUGCCAUUUC	GC	GUUGAAUG	3990
1050	GAUAUUU	GUUUUUU	1482	CALUAAAG	UGAUU	GCNUGCCAUUUC	GC	AGAAUUC	3991
1058	GCUUUAU	GUUUUAU	1483	UUAAGAAG	UGAUU	GCNUGCCAUUUC	GC	AUUUAAGC	3992
1068	CUUAUAU	GCUUUAU	1484	UAUUGAG	UGAUU	GCNUGCCAUUUC	GC	AUUUAAGG	3993
1072	AUAUGAU	GUAUGUA	1485	CUUUAUG	UGAUU	GCNUGCCAUUUC	GC	AUUGCAU	3994
1103	ACUUUUC	GCACAUU	1486	UAAUGUG	UGAUU	GCNUGCCAUUUC	GC	GAGAAUG	3995
1139	ACUUAU	GAUUUUU	1487	UAAAGUU	UGAUU	GCNUGCCAUUUC	GC	ACAAUUG	3996
1155	ACCCCUU	GUGGCGA	1488	UUGCCGAG	UGAUU	GCNUGCCAUUUC	GC	ACCGGGU	3997
1177	UGUUUAU	GCUUUAU	1489	ACAUUGG	UGAUU	GCNUGCCAUUUC	GC	AUUGACCA	3998
1188	AAUGUUU	GCGAGCGA	1490	UGGUGGAG	UGAUU	GCNUGCCAUUUC	GC	AAACAUU	3999
1191	UGUUUGU	GAUUAU	1491	GUUUUGU	UGAUU	GCNUGCCAUUUC	GC	AGCAACA	4000
1194	UUGUGAC	GAUCCUCC	1492	GGGGUUU	UGAUU	GCNUGCCAUUUC	GC	GUUACAA	4001
1234	CAUUGAC	GAUUGUU	1493	CACGUAU	UGAUU	GCNUGCCAUUUC	GC	GUUGAGG	4002
1238	CAUGGUAU	GUGGAGC	1494	GUUCCAG	UGAUU	GCNUGCCAUUUC	GC	AUUGCCU	4003
1262	UUUUUUU	CCGAUUA	1495	UGGAUUG	UGAUU	GCNUGCCAUUUC	GC	AGAGAGA	4004
1265	CUUUGCC	AUUAUAC	1496	GUUUGAU	UGAUU	GCNUGCCAUUUC	GC	GGCAGAG	4005
1275	UCCUUAU	GUGUAU	1497	GAUUUGG	UGAUU	GCNUGCCAUUUC	GC	GUUAUGA	4006
1290	UCCUUGCC	GCUUUUU	1498	AAUUAAG	UGAUU	GCNUGCCAUUUC	GC	GGCUAGA	4007
1299	CUUUUUU	GUGGAGC	1499	GUUGGAG	UGAUU	GCNUGCCAUUUC	GC	AAACAG	4008
1303	UUUUUGC	GAUUAU	1500	ACCUUGU	UGAUU	GCNUGCCAUUUC	GC	GAACAAA	4009
1335	UCCGACU	GAUUAU	1501	AGAUUUG	UGAUU	GCNUGCCAUUUC	GC	AGUCCGA	4010
1349	UUUUUGU	GCUUUUU	1502	CGGAGAG	UGAUU	GCNUGCCAUUUC	GC	ACCAAGA	4011
1357	GUUUUCC	GCAUAUA	1503	UAUAUUU	UGAUU	GCNUGCCAUUUC	GC	GGGAGAG	4012
1382	CAUUGGU	GUUCCAC	1504	CAGCCUAG	UGAUU	GCNUGCCAUUUC	GC	AGCCUAG	4013
1392	UAGGUGU	GUUCCAC	1505	GUUGGAG	UGAUU	GCNUGCCAUUUC	GC	ACAGCUA	4014
1395	GUUGUGU	GCUAUUG	1506	CCAUUUU	UGAUU	GCNUGCCAUUUC	GC	AGCAUAC	4015
1411	GAUUAU	GUGGAGU	1507	AGUCCUG	UGAUU	GCNUGCCAUUUC	GC	GUUGAGU	4016
1442	CCUUGGCG	GUUAUUC	1508	GAUUUCAG	UGAUU	GCNUGCCAUUUC	GC	GUCCAGC	4017
1445	UCCGUGU	GAUUGGU	1509	GGGGAUU	UGAUU	GCNUGCCAUUUC	GC	AGGCGCA	4018
1452	UUAUUGC	GUGGAGC	1510	GUUGUUG	UGAUU	GCNUGCCAUUUC	GC	GGGAGUA	4019
1459	CGUGGAG	GAUCCUCC	1511	GGGGAUU	UGAUU	GCNUGCCAUUUC	GC	GUCCGCG	4020

Table 39

1474	CCGCGGCC G	CTDGGGCG	1512	GCCTCAG	UGAUG	GC AUGGACUAUAGC	GCG	GCCTCCG	4021
1489	GCUCUACC G	CCCGCUUC	1513	GAAGCGG	UGAUG	GC AUGGACUAUAGC	GCG	GGUAGAGC	4022
1493	UACCGCCC G	CUUUCUG	1514	CGGABAG	UGAUG	GC AUGGACUAUAGC	GCG	GGCGCGUA	4023
1501	GCUCUCCC G	CCUUAUUG	1515	ACUAUAG	UGAUG	GC AUGGACUAUAGC	GCG	GGABAGC	4024
1513	AUGUAACC G	CCGUCUA	1516	UGGACGGU	UGAUG	GC AUGGACUAUAGC	GCG	GGUACAU	4025
1528	CACGGGCC G	CACUCUC	1517	GAGAGGU	UGAUG	GC AUGGACUAUAGC	GCG	GCCTCCUG	4026
1542	CUUUAUC G	CGGACUC	1518	GGAGUCG	UGAUG	GC AUGGACUAUAGC	GCG	GUABAGG	4027
1559	CGUUCUG G	CCUUCUA	1519	UGABAGG	UGAUG	GC AUGGACUAUAGC	GCG	ACBAGCG	4028
1571	UUGUAUUG G	CCGGACCG	1520	CGUUCGG	UGAUG	GC AUGGACUAUAGC	GCG	AGAUAGA	4029
1583	GACCGUUG G	CACUCUC	1521	GCGAGGU	UGAUG	GC AUGGACUAUAGC	GCG	ACACGUC	4030
1590	UGACUUC G	CUUCACU	1522	AGGUABG	UGAUG	GC AUGGACUAUAGC	GCG	GGAGUCCA	4031
1601	UGACUUC G	CACUCUC	1523	GGAGUUG	UGAUG	GC AUGGACUAUAGC	GCG	AGAGUGA	4032
1608	UGACUUC G	CACUCUC	1524	UCUCUAUG	UGAUG	GC AUGGACUAUAGC	GCG	GAUCUGCA	4033
1624	ACACCCGU G	ACCGGCCA	1525	UGGCGUUG	UGAUG	GC AUGGACUAUAGC	GCG	ACCGUGU	4034
1628	CGUGAAC G	CCACACAG	1526	CUUGUGG	UGAUG	GC AUGGACUAUAGC	GCG	GUUACAG	4035
1642	AGBAACU G	CCCAAGU	1527	ACCUAGG	UGAUG	GC AUGGACUAUAGC	GCG	AGGUUCU	4036
1654	AUGUCUUG G	CUAAGAG	1528	CUUUAUG	UGAUG	GC AUGGACUAUAGC	GCG	AAAGCUU	4037
1690	AUGUCUUG G	ACCGACU	1529	AGGUUGU	UGAUG	GC AUGGACUAUAGC	GCG	GUUGACU	4038
1694	CAAGACCC G	ACCUAGG	1530	CUUAGGU	UGAUG	GC AUGGACUAUAGC	GCG	GGUUGUG	4039
1700	CCGACUUG G	AGGCAUAC	1531	GUUUGCU	UGAUG	GC AUGGACUAUAGC	GCG	AGGUUCG	4040
1730	UUUUUAU G	AGUUGGAG	1532	CUCCGACU	UGAUG	GC AUGGACUAUAGC	GCG	AUUAUACA	4041
1818	AGCACCAU G	CACUUAU	1533	AAAGUUG	UGAUG	GC AUGGACUAUAGC	GCG	AUGGUUCU	4042
1835	UGACUUC G	CCUAUAU	1534	UGAUUAG	UGAUG	GC AUGGACUAUAGC	GCG	AGAGUGA	4043
1883	CAGACUUG G	CCUUGGU	1535	ACCAAGG	UGAUG	GC AUGGACUAUAGC	GCG	ACAGUUG	4044
1912	UGACAUU G	ACCCUAU	1536	AUACGGU	UGAUG	GC AUGGACUAUAGC	GCG	AUGUCCA	4045
1959	UUUUUUU G	CCUUCUA	1537	UACAGAG	UGAUG	GC AUGGACUAUAGC	GCG	AAAAAGA	4046
1966	UGCCUUCU G	ACUUCU	1538	AAAGAUU	UGAUG	GC AUGGACUAUAGC	GCG	AGAGUGA	4047
1985	UUUUAUUC G	AGAUUUC	1539	GGAGAUU	UGAUG	GC AUGGACUAUAGC	GCG	GAUAGAA	4048
1996	AUUCUUC G	ACACCGC	1540	AGCGUUG	UGAUG	GC AUGGACUAUAGC	GCG	GGAGAGU	4049
2002	UGGACACC G	CCUUCUC	1541	AGCAGAG	UGAUG	GC AUGGACUAUAGC	GCG	GGUUCUG	4050
2008	CCGCUUCU G	CCUUAU	1542	AUACAGG	UGAUG	GC AUGGACUAUAGC	GCG	AGAGCGG	4051
2092	UGGGGGU G	AGUUAU	1543	CAUACU	UGAUG	GC AUGGACUAUAGC	GCG	ACCCACAC	4052
2097	GUUGAUU G	AUGUAU	1544	AGAUUACU	UGAUG	GC AUGGACUAUAGC	GCG	AACUCCG	4053
2100	GGUUAU G	AUUCUAGC	1545	GCUGAUU	UGAUG	GC AUGGACUAUAGC	GCG	AUOBACUC	4054

Table 39

2237	UTUUGGCG G AGAAGCG	1546	CAUUAUUCU UGAUG GCAUGGACUAUAGC GCG GCCCAAAA	4055
2251	CUUUGUUCU G AAUAUUUG	1547	CAAAUAUU UGAUG GCAUGGACUAUAGC GCG AAGACAG	4056
2282	GUAGAUGC G CACCTCUC	1548	GAGAGUUG UGAUG GCAUGGACUAUAGC GCG GAUUCAC	4057
2293	CUCUUCUUC G CAUAUAGA	1549	UCUAUAUG UGAUG GCAUGGACUAUAGC GCG AAGAGAG	4058
2311	CAUAAAU G CCCCUGUG	1550	GAUAGGGG UGAUG GCAUGGACUAUAGC GCG AUUUGGUG	4059
2354	UUUAUAGC G AAGAGGCA	1551	UCCUCUUU UGAUG GCAUGGACUAUAGC GCG GUUUAACA	4060
2368	ACUCCUUC G CCUCGCG	1552	CUUCGAGG UGAUG GCAUGGACUAUAGC GCG GAGGAGU	4061
2393	CUCGACUC G CCAUGGAA	1553	UUCGUCUUG UGAUG GCAUGGACUAUAGC GCG GAGCGAG	4062
2399	UGGACAGC G AAGUAUUC	1554	GAGACUUU UGAUG GCAUGGACUAUAGC GCG GUUCGCA	4063
2412	UCUCAAUC G CCGCUGUG	1555	CGAGCGGG UGAUG GCAUGGACUAUAGC GCG GAUUGAGA	4064
2415	CAUUGGCC G CGUCCGAG	1556	CUUCGAGC UGAUG GCAUGGACUAUAGC GCG GCGAUUG	4065
2420	GCUGGUCU G CAGAGAAU	1557	AUUUUUCU UGAUG GCAUGGACUAUAGC GCG GACGCGC	4066
2514	GUUAACUU G CUUUAACU	1558	GAUUAJAG UGAUG GCAUGGACUAUAGC GCG AAGBUACC	4067
2549	CUUUUCUU G ACUAUACU	1559	AUFAAUUG UGAUG GCAUGGACUAUAGC GCG AGAAAGG	4068
2560	AUUUAUUU G CAGGAGAG	1560	UCUUCUUG UGAUG GCAUGGACUAUAGC GCG AGCAUAG	4069
2576	ACAUUGUU G AUAGAUGU	1561	ACNUCAU UGAUG GCAUGGACUAUAGC GCG AACUAUGU	4070
2615	CAGUAAAU G AAAACAGG	1562	CUUGUUUU UGAUG GCAUGGACUAUAGC GCG AUUUAUUG	4071
2641	UUAACUAU G CCUGCTAG	1563	CUAGCAGG UGAUG GCAUGGACUAUAGC GCG AUAGUAAA	4072
2645	CUAUGCCU G CUAGUUUU	1564	AAACCUAG UGAUG GCAUGGACUAUAGC GCG AGCAUAG	4073
2677	AAUAUUUU G CCGUUAUA	1565	UCUAGGGG UGAUG GCAUGGACUAUAGC GCG AAUAUUUU	4074
2740	UUCGAGAC G CGACUAUA	1566	UUAUUGUG UGAUG GCAUGGACUAUAGC GCG GUUCGAAA	4075
2742	CCAGAGCG G ACUAUAUU	1567	AAUAUUUG UGAUG GCAUGGACUAUAGC GCG GCUUCUG	4076
2804	CACUAGCG G CCUCAUUU	1568	AAAUAGGG UGAUG GCAUGGACUAUAGC GCG GCUACUG	4077
2814	CUUAUUUU G CGGCTCAC	1569	GUACCCUG UGAUG GCAUGGACUAUAGC GCG AAUAUUG	4078
2875	CAACCTUC G AAGAAGCA	1570	UCCUUUUU UGAUG GCAUGGACUAUAGC GCG GAGUUUUG	4079
2928	UUUUCCCC G AUUAUAG	1571	CGUAUAGU UGAUG GCAUGGACUAUAGC GCG GGGAGAA	4080
2946	UGAGACCU G CAUUCAAA	1572	UUUAUAGU UGAUG GCAUGGACUAUAGC GCG AGGCTUCA	4081
2990	CUCAACCC G CACAAGAA	1573	UCCUUGUG UGAUG GCAUGGACUAUAGC GCG GGGUUGAG	4082
3012	GCUCGAGC G CCACACAG	1574	CUUUIUGG UGAUG GCAUGGACUAUAGC GCG GUCCGCCC	4083
3090	GCCTCCAC G CUUUGGCG	1575	GCCUUCUG UGAUG GCAUGGACUAUAGC GCG GUGAGGCG	4084
3113	ACAAAUUU G CCAGACAG	1576	GCUCUGUG UGAUG GCAUGGACUAUAGC GCG ACAGUUUG	4085
3132	CUUCUCCU G CUUCACCC	1577	GUUGAGUG UGAUG GCAUGGACUAUAGC GCG AGGAGAG	4086
51	AGGACCUU G UAUUUUUG	1578	GGAAGUUA UGAUG GCAUGGACUAUAGC GCG AGGGCCCU	4087
106	AGAAUAUU G UUCUUGCC	1579	GCGAGAGA UGAUG GCAUGGACUAUAGC GCG AGUAUUUU	4088

Table 39

148	GEGACCUU G UACCGAAC	1580	GUUCGGUA UGAUG GCAUGCACAUAUC GCG AGCGUCC	4089
198	CUUCUCU G UUAAGAGC	1581	GCUGUUA UGAUG GCAUGCACAUAUC GCG ACAGCAG	4090
219	UUUUCUU G UUAACCAA	1582	UUUGUUA UGAUG GCAUGCACAUAUC GCG AGAABAA	4091
297	ACACCCUU G UUCUGGCG	1583	CGAAGCA UGAUG GCAUGCACAUAUC GCG ACAGGUG	4092
299	ACCGGUU G UUCUGGCG	1584	GGCAGCA UGAUG GCAUGCACAUAUC GCG ACACGGU	4093
347	ACCAACUU G UUGUCUC	1585	GAGACAA UGAUG GCAUGCACAUAUC GCG AGUUGU	4094
350	AACCUUU G UUCUCCAA	1586	UUGAGCA UGAUG GCAUGCACAUAUC GCG AACGUGU	4095
362	ACCAUUU G UCCUGGUA	1587	AACAGCA UGAUG GCAUGCACAUAUC GCG AAUUGGA	4096
381	CGCUGAU G UUCUGGCG	1588	CGCAGCA UGAUG GCAUGCACAUAUC GCG AUCCGCG	4097
383	CUGAUUU G UUCUGGCG	1589	GGCGAGA UGAUG GCAUGCACAUAUC GCG ACNUCAG	4098
438	AUCUUCU G UUGGUUU	1590	AGACCAA UGAUG GCAUGCACAUAUC GCG AAGAGAU	4099
465	CAGGUUU G UUGCCUU	1591	ACGGCAA UGAUG GCAUGCACAUAUC GCG AUACCTG	4100
476	GGCGUUU G UUCUCUAA	1592	UUAAGGA UGAUG GCAUGCACAUAUC GCG AAACGGG	4101
555	ACUUCUU G UUDCCUU	1593	GAGGAAA UGAUG GCAUGCACAUAUC GCG AUGAGGU	4102
566	UCCUUAU G UUDGUUA	1594	UACGCAA UGAUG GCAUGCACAUAUC GCG AUGAGGA	4103
572	AUGUUCU G UACNAAC	1595	GUUUUUA UGAUG GCAUGCACAUAUC GCG AGCAGAU	4104
602	CUGACUU G UAUUCCCA	1596	UGGGAUA UGAUG GCAUGCACAUAUC GCG AGGUCCAG	4105
694	UGCCAUU G UUCAGUGG	1597	CCACUGAA UGAUG GCAUGCACAUAUC GCG AAUUGCA	4106
724	CCCCACU G UCUGGUU	1598	AAGCAGA UGAUG GCAUGCACAUAUC GCG AGUGGGG	4107
750	UGGUAU G UUGUUUU	1599	CAAAACCA UGAUG GCAUGCACAUAUC GCG AUCAUCCA	4108
771	CCAGUUCU G UACACAU	1600	AUGUUUA UGAUG GCAUGCACAUAUC GCG AGACUUG	4109
801	AUGCCUU G UUAACCAU	1601	AUGGUUA UGAUG GCAUGCACAUAUC GCG AGCGCAU	4110
819	UUUCUUU G UCUUGGCG	1602	CCAAAGA UGAUG GCAUGCACAUAUC GCG AAAGAAA	4111
888	UGGAUUU G UAAUUGG	1603	CCAAUUA UGAUG GCAUGCACAUAUC GCG AUUUCCA	4112
927	AACUAUU G UCAAAAA	1604	UUUUUUA UGAUG GCAUGCACAUAUC GCG AAUAUUU	4113
944	AUCAAUU G UGUUUUAG	1605	CUAAACA UGAUG GCAUGCACAUAUC GCG AUUUGAU	4114
946	CAAAAUU G UUUUAGGA	1606	UCCUAAA UGAUG GCAUGCACAUAUC GCG ACUUUUA	4115
963	AACUUCU G UAAACAG	1607	CCGUUUA UGAUG GCAUGCACAUAUC GCG AGAGUUU	4116
991	GAAUAUU G UCAACGAA	1608	UUCGUUA UGAUG GCAUGCACAUAUC GCG AUUCUUC	4117
1002	AACGAUU G UUGUUCUU	1609	AAGACCA UGAUG GCAUGCACAUAUC GCG AAUUGUU	4118
1039	CACCAUU G UGAUAUU	1610	AAUAUCCA UGAUG GCAUGCACAUAUC GCG AUUCGUU	4119
1137	AACGAUU G UUAACUU	1611	AAGUCCA UGAUG GCAUGCACAUAUC GCG AUUCUUU	4120
1184	UGCAAGU G UUGUCAGA	1612	UCAGGAA UGAUG GCAUGCACAUAUC GCG ACUUGCA	4121
1251	GACUUUU G UUCUCCU	1613	AGGAGCA UGAUG GCAUGCACAUAUC GCG AAGGUUC	4122

Table 39

1253	ACCUUGU	g UCUCUUC	1614	AGAGGAG	UGAUG	GCAUGCACAUAUC	GCG	ACNAGGU	4123
1294	AGCGCUU	g UUUUGUC	1615	GAGCAAA	UGAUG	GCAUGCACAUAUC	GCG	AAGCGGU	4124
1344	ACAAUUC	g UCGUGUC	1616	GAGCAGA	UGAUG	GCAUGCACAUAUC	GCG	AGAAUUG	4125
1390	CGUGGCU	g UGUGCCA	1617	UGCGAGA	UGAUG	GCAUGCACAUAUC	GCG	AGCCTIAGC	4126
1425	CGUCUUU	g UUUAGUC	1618	GACUAAA	UGAUG	GCAUGCACAUAUC	GCG	AAAGGAGC	4127
1508	CGCCUAU	g UACCGACC	1619	GUUGGUA	UGAUG	GCAUGCACAUAUC	GCG	AAUAGGCG	4128
1557	CCCGUUC	g UGCUUUC	1620	AGAGGCA	UGAUG	GCAUGCACAUAUC	GCG	AGAGGGG	4129
1581	CGAGCGU	g UGCUCUC	1621	GAAGGCA	UGAUG	GCAUGCACAUAUC	GCG	ACGUGCCG	4130
1684	UCAGCAU	g UCAAGGAC	1622	GUUGGUA	UGAUG	GCAUGCACAUAUC	GCG	AUUGUGA	4131
1719	CAAGAGU	g UGUUUUA	1623	UAAACAA	UGAUG	GCAUGCACAUAUC	GCG	AGUCUUUG	4132
1721	AAGACUG	g UGUUUUA	1624	AUUAACA	UGAUG	GCAUGCACAUAUC	GCG	ACAGUCUU	4133
1723	GACUGUG	g UUUUAUG	1625	UCUUAAA	UGAUG	GCAUGCACAUAUC	GCG	ACACAGUC	4134
1772	AGGUCUU	g UUAUAGA	1626	UCUAGUA	UGAUG	GCAUGCACAUAUC	GCG	AAAGACCU	4135
1785	AGGAGGU	g UAGGCAUA	1627	UAUCCUA	UGAUG	GCAUGCACAUAUC	GCG	AGCCUCCU	4136
1801	AAAUUGU	g UGUUACC	1628	GUUGAAC	UGAUG	GCAUGCACAUAUC	GCG	ACCAUUU	4137
1803	AUUGUGU	g UUCACCAg	1629	CUUGUAA	UGAUG	GCAUGCACAUAUC	GCG	ACACCAU	4138
1850	CAUCUAU	g UUCUUGUC	1630	GACUAGAA	UGAUG	GCAUGCACAUAUC	GCG	AUGAGAU	4139
1856	AUGUCU	g UUCUACUG	1631	CAGUAGAA	UGAUG	GCAUGCACAUAUC	GCG	AUGACAU	4140
1864	GUUCUAU	g UUCAGGCC	1632	GGCUUGAA	UGAUG	GCAUGCACAUAUC	GCG	AGUAGGAC	4141
1881	UCACAGU	g UGCUUUG	1633	CGAAGCA	UGAUG	GCAUGCACAUAUC	GCG	AGCUUGGA	4142
1939	GAGCUUC	g UGGAGUUA	1634	UAACUCCA	UGAUG	GCAUGCACAUAUC	GCG	AGAGUCUC	4143
2013	UGUCUUU	g UAUUGGGG	1635	CCCCGUA	UGAUG	GCAUGCACAUAUC	GCG	AGAGGCA	4144
2045	GAAACAU	g UUCACUUC	1636	GAGUGAAA	UGAUG	GCAUGCACAUAUC	GCG	AAUUGUCC	4145
2082	CUAUUCU	g UGUUGGGG	1637	CCCCAAC	UGAUG	GCAUGCACAUAUC	GCG	AGAAUAGC	4146
2084	AUUAUCU	g UUGUGGUG	1638	CACCCAA	UGAUG	GCAUGCACAUAUC	GCG	ACAGAAUA	4147
2167	UAGCAU	g UCAACGUU	1639	ACGUGUA	UGAUG	GCAUGCACAUAUC	GCG	AUUGUGA	4148
2205	CAACUAU	g UGUUUAU	1640	UGAAACCA	UGAUG	GCAUGCACAUAUC	GCG	AAUAGUUA	4149
2222	CAUUCUU	g UCUUUAU	1641	AAGUAGA	UGAUG	GCAUGCACAUAUC	GCG	AGGAAUUG	4150
2245	GAGAAAU	g UUCUUGAA	1642	UUCAGAA	UGAUG	GCAUGCACAUAUC	GCG	AGUUCUUC	4151
2262	UUUUUGU	g UCUUUUGG	1643	CGAAAGCA	UGAUG	GCAUGCACAUAUC	GCG	ACCAAUA	4152
2274	UUUGAGU	g UGGAUUGG	1644	CGAAUCCA	UGAUG	GCAUGCACAUAUC	GCG	ACUUCAAA	4153
2344	AAACUAU	g UGUUUAU	1645	UCUACAA	UGAUG	GCAUGCACAUAUC	GCG	AGUAGUUA	4154
2347	CUACUGU	g UUAAGGCA	1646	UGGUUUA	UGAUG	GCAUGCACAUAUC	GCG	ACAGUAG	4155
2450	AUCUAU	g UUAUUUU	1647	AUAUCAA	UGAUG	GCAUGCACAUAUC	GCG	AUUGAGAU	4156

Table 39

2573	AGGACATU G UGAUAGA	1648	UCUAUCAA UGAUG GCAUGGACUAUGC GCG AAUGUCCU	4157
2583	UGAUAGAU G UAAGCAAU	1649	AUUUGCUA UGAUG GCAUGGACUAUGC GCG AUCUUAUA	4158
2594	AGCAUUG G UGGGCCCC	1650	GUGCCCCA UGAUG GCAUGGACUAUGC GCG AAUUGCU	4159
2663	AUCCCAAU G UACUAAA	1651	UUUUGUAA UGAUG GCAUGGACUAUGC GCG AUUGGGAU	4160
2717	CAGAGUAT G UAGUUAU	1652	AUUUACUA UGAUG GCAUGGACUAUGC GCG AURCUCUG	4161
2901	AUCUUUCU G UCCCAAU	1653	AUUGGGA UGAUG GCAUGGACUAUGC GCG AGAAAGAU	4162
3071	GEGGACU G UUGGGUG	1654	CACCCCAA UGAUG GCAUGGACUAUGC GCG AGUCCCC	4163
3111	UCACACU G UGCAGCA	1655	UGCUGGCA UGAUG GCAUGGACUAUGC GCG AGUUGUA	4164

Input Sequence = AF100308. Cut Site = YG/M or UG/U.
 Stem Length = 8. Core Sequence = UGAUG GCAUGGACUAUGC GCG
 AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 40
 Table 40: Human HBV Zinzyme Ribozyme and Substrate Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
61	ACUUCUCCU G CUGUGGCG	1448	GCACCCAG GCCGaaagGCCaGuaCaadGGuCU AGGAAAGU	4165
94	UGAGCCCU G CUCAGAU	1450	AUUCUAG GCCGaaagGCCaGuaCaadGGuCU AGGCGUCA	4166
112	CUUGUCCU G CCUAUUG	1451	CGUAUUG GCCGaaagGCCaGuaCaadGGuCU AGGAGACG	4167
169	AGAACUUC G CAUCAGGA	1454	UCCUGAG GCCGaaagGCCaGuaCaadGGuCU GAUGUUCU	4168
192	GACGCCCU G CUGUGUUG	1455	AAACACAG GCCGaaagGCCaGuaCaadGGuCU AGUGGUCC	4169
315	CAAAAUUC G CAUGUCCA	1457	UGGCAUG GCCGaaagGCCaGuaCaadGGuCU GAUUUUUG	4170
374	UGGUUAUC G CUGAGUUG	1458	ACAUCCAG GCCGaaagGCCaGuaCaadGGuCU GAUAACCA	4171
387	AUGUGUUC G CGCGUUU	1459	AAAGCCCG GCCGaaagGCCaGuaCaadGGuCU AGACACAU	4172
410	CUUCUCCU G CAUCCUCC	1460	GCAGAGUG GCCGaaagGCCaGuaCaadGGuCU AGGAGAG	4173
417	UGCAUCCU G CUGCUAUG	1461	CAUAGAG GCCGaaagGCCaGuaCaadGGuCU AGGAUCCA	4174
420	AUCCUCCU G CUAGCCU	1462	AGCAUAG GCCGaaagGCCaGuaCaadGGuCU AGCAGAU	4175
425	CGUGUAGU G CCUCAUU	1463	AGUAGAG GCCGaaagGCCaGuaCaadGGuCU AUBGCGAC	4176
468	GUUAUUU G CCCUUUG	1464	GAACCGG GCCGaaagGCCaGuaCaadGGuCU AUCUACCC	4177
518	CGGACCAU G CAUAACU	1465	AGUUUUUG GCCGaaagGCCaGuaCaadGGuCU AUGGUCCG	4178
527	CAAAACCU G CACCAACU	1466	GAUUUUUG GCCGaaagGCCaGuaCaadGGuCU AGGUUUUG	4179
538	CAUCUCCU G CUCAGAGA	1467	UCCUUAG GCCGaaagGCCaGuaCaadGGuCU AGGAGUUG	4180
569	CUUAUUU G CUGUACAA	1468	UUGUACG GCCGaaagGCCaGuaCaadGGuCU AACUAGAG	4181
596	CGGAACCU G CACCUUGA	1469	UACUGUUG GCCGaaagGCCaGuaCaadGGuCU AGUUUCCG	4182
631	GGGCUUUC G CAUAUAC	1470	GUUUUUUG GCCGaaagGCCaGuaCaadGGuCU GAUAGCCC	4183
687	UUAUAAGU G CCUUUUU	1471	ACAAUUG GCCGaaagGCCaGuaCaadGGuCU ACUAGUAA	4184
795	CCUUUAU G CCUGUUU	1474	ACACGUG GCCGaaagGCCaGuaCaadGGuCU AUAAGGG	4185
798	UUUAUCC G CUGUACCC	1475	GUUAACG GCCGaaagGCCaGuaCaadGGuCU GGCUAATA	4186
911	GGCACAAU G CCACAGGA	1476	UCCUUUG GCCGaaagGCCaGuaCaadGGuCU AAUUGUCC	4187
1020	UGGGUUUU G CCGCCUU	1479	AGGCGCG GCCGaaagGCCaGuaCaadGGuCU AAACCCCA	4188
1023	GUUUUCC G CCUUUUC	1480	GAAGGAG GCCGaaagGCCaGuaCaadGGuCU GGCAAACG	4189
1034	CCUUUCC G CAUUUGG	1481	CCACUUUG GCCGaaagGCCaGuaCaadGGuCU GUGAAAGG	4190
1050	GAUAUUUC G CUUUAAUG	1482	CAUUAAAG GCCGaaagGCCaGuaCaadGGuCU AGAAUUG	4191
1058	CCUUUAU G CCUUUAU	1483	UUUAUAG GCCGaaagGCCaGuaCaadGGuCU AUUAUAGC	4192
1068	CUUUUAU G CAUGAUA	1484	UAUUAAG GCCGaaagGCCaGuaCaadGGuCU AUUAUAG	4193
1072	AUAUCCAU G CAUACAG	1485	CUUUUAU GCCGaaagGCCaGuaCaadGGuCU AUUCUAUU	4194

Table 40

1103	ACUUCUC G CCAACUA	1486	UAAUGUG GCGaaagGCGaGuaGGuCU GNAAGA	4195
1155	ACCCGUU G CUGCGAA	1488	UUGCGAG GCGaaagGCGaGuaGGuCU AACGGGU	4196
1177	UGGUCUU G CCGAGUU	1489	ACACUGG GCGaaagGCGaGuaGGuCU AUGAGCA	4197
1188	AAGUGUU G CUGACGA	1490	UGGUCUAG GCGaaagGCGaGuaGGuCU AAMACUU	4198
1194	UUGGUGG G CAACCC	1492	GGGGUGG GCGaaagGCGaGuaGGuCU GUACGAA	4199
1234	CAUACAG G CAUGGUG	1493	CAGCAUG GCGaaagGCGaGuaGGuCU GUGAUGG	4200
1238	CAGGCAU G CUGGAGC	1494	GUUCACG GCGaaagGCGaGuaGGuCU AUGGCGU	4201
1262	UCUCCUU G CCGAUCA	1495	UGAUGGG GCGaaagGCGaGuaGGuCU AGAGUAA	4202
1275	UCCAUAC G CGGAACU	1497	GAGUUCG GCGaaagGCGaGuaGGuCU GGUUAGA	4203
1290	UCUAGCC G CUGUUUU	1498	AAAACAAG GCGaaagGCGaGuaGGuCU GGCUGAA	4204
1299	CUGUUUU G CUGGACG	1499	GCTUCAG GCGaaagGCGaGuaGGuCU ABAACAAG	4205
1303	UUUUGUC G CAGCAGU	1500	ACUUGUG GCGaaagGCGaGuaGGuCU GACACAA	4206
1349	UUUGUUU G CUUCCCG	1502	CGGAGAG GCGaaagGCGaGuaGGuCU ACACAGA	4207
1357	GCUUUCU G CAUAUUA	1503	UAUAUUU GCGaaagGCGaGuaGGuCU GCGAGAG	4208
1382	CCAUUGU G CUAGGUG	1504	CAGCUUAG GCGaaagGCGaGuaGGuCU AGCAGUG	4209
1392	UAGGUGU G CUCCACG	1505	GUUGGAG GCGaaagGCGaGuaGGuCU ACAGCUA	4210
1395	GCTUGUC G CCAACUG	1506	CCAGTUG GCGaaagGCGaGuaGGuCU AGCACAC	4211
1411	GAUCCUAC G CGGACUU	1507	ACGUUCC GCGaaagGCGaGuaGGuCU UUAAGATC	4212
1442	CCGUCCG CUGAAUCC	1508	GGAUUCAG GCGaaagGCGaGuaGGuCU GCGACGG	4213
1452	UGAAUCC G CGAGAC	1510	GUUUCUG GCGaaagGCGaGuaGGuCU GGGAUCA	4214
1474	CUUGGGC G CUUGGUC	1512	GCCCGAG GCGaaagGCGaGuaGGuCU GCGCCCG	4215
1489	GUUUAAC G CCGGCUU	1513	GAGCCGG GCGaaagGCGaGuaGGuCU GGUAGAGC	4216
1493	UACGCGC G CUUCCCG	1514	CGAGAGG GCGaaagGCGaGuaGGuCU GCGCGUA	4217
1501	GCUUCCU G CUUUUUU	1515	ACAAUUG GCGaaagGCGaGuaGGuCU GGGAGAC	4218
1528	CAGGGGC G CACUUCU	1517	GAGAGUG GCGaaagGCGaGuaGGuCU GCGCCUG	4219
1542	CUUUNAC G CGACUUC	1518	GGAGUCC GCGaaagGCGaGuaGGuCU GUAAAAG	4220
1559	CCGUUUU G CUUUCUA	1519	UGAGAGG GCGaaagGCGaGuaGGuCU ACAGACG	4221
1571	UCUUAUU G CCGAGUC	1520	GUGUCCG GCGaaagGCGaGuaGGuCU AGAUAGA	4222
1583	GACGUGU G CACUUCG	1521	GCGAAGG GCGaaagGCGaGuaGGuCU ACACGUC	4223
1590	UACUUUC G CUUACCU	1522	AGUGAGG GCGaaagGCGaGuaGGuCU GAAAGUG	4224
1601	UGACUUU G CACGUUC	1523	CGAGCUG GCGaaagGCGaGuaGGuCU AGAGUGA	4225
1608	UGACUUC G CAUGAGA	1524	CCUUAUG GCGaaagGCGaGuaGGuCU GACUGCA	4226
1628	CGUGAAC G CCACAGG	1526	UCUUGGG GCGaaagGCGaGuaGGuCU GUUCACG	4227
1642	AGGACUU G CCGAGUU	1527	ACUUGGG GCGaaagGCGaGuaGGuCU AGGUUCU	4228

Table 40

1654	AAGGUCU	G CAUAGAG	1528	UCUUAUG	GCgaaagGCGaGuCaaGGuCU	AAGACUU	4229
1818	AGACCAU	G CAUUAU	1533	AAAAGUG	GCgaaagGCGaGuCaaGGuCU	AUGGUCU	4230
1835	UCACUCU	G CCUAUAC	1534	UUAUAGG	GCgaaagGCGaGuCaaGGuCU	AGAGUGA	4231
1883	CCGACUGU	G CUCUGUG	1535	ACCCAAGG	GCgaaagGCGaGuCaaGGuCU	ACAGCUGU	4232
1959	UUUUUUU	G CUCUCUGA	1537	UCAGAAGG	GCgaaagGCGaGuCaaGGuCU	AAAAAGA	4233
2002	UCGACACC	G CUCUGUC	1541	AGCAGAGG	GCgaaagGCGaGuCaaGGuCU	GGUGUGA	4234
2008	CGCCUCU	G CUCUGAU	1542	AUACGAG	GCgaaagGCGaGuCaaGGuCU	AGAGCGG	4235
2282	GUGAUCU	G CACUCCUC	1548	GAGGAGU	GCgaaagGCGaGuCaaGGuCU	GAUCCAC	4236
2293	CUCUCUCU	G CAUUAUGA	1549	UCUUAUUG	GCgaaagGCGaGuCaaGGuCU	AGAGGAG	4237
2311	CACCAAU	G CCCUAUC	1550	GAUAGGUG	GCgaaagGCGaGuCaaGGuCU	AUUUGUG	4238
2388	ACTUCCUC	G CUCGACG	1552	CUCGAGG	GCgaaagGCGaGuCaaGGuCU	GAAGGAGU	4239
2393	CUCGCCUC	G CAGCGA	1553	UUCGUCU	GCgaaagGCGaGuCaaGGuCU	GAGGACG	4240
2412	CUCUAUC	G CCGCUGG	1555	CGACCGG	GCgaaagGCGaGuCaaGGuCU	GAUUGAG	4241
2415	CAUUCGCC	G CGUCGAG	1556	CUCGACG	GCgaaagGCGaGuCaaGGuCU	GCGCAUUG	4242
2420	GCAGCUC	G CAGAGAU	1557	AUUCUUG	GCgaaagGCGaGuCaaGGuCU	GAGCGGC	4243
2514	GUUACCU	G CUUUAUC	1558	GAUUAAG	GCgaaagGCGaGuCaaGGuCU	AAAGUACC	4244
2560	AUUAUUU	G CAGAGAGA	1560	UCUUCUCU	GCgaaagGCGaGuCaaGGuCU	AAUUGAU	4245
2641	UUAACUU	G CUCGUCG	1563	CUAGAGG	GCgaaagGCGaGuCaaGGuCU	AUAGGUA	4246
2645	CUAUGCU	G CUAGUUU	1564	AAACUAG	GCgaaagGCGaGuCaaGGuCU	AGGCNUAG	4247
2677	AAUAUUU	G CCUUAAG	1565	UCUAAGG	GCgaaagGCGaGuCaaGGuCU	AAAUUUU	4248
2740	UUCAGAC	G CGCAUA	1566	UAAUUGG	GCgaaagGCGaGuCaaGGuCU	GUUCGUA	4249
2804	CACUAGC	G CUCUAUU	1568	AAUAGAG	GCgaaagGCGaGuCaaGGuCU	GCUACUG	4250
2814	CUCAUUU	G CGGUCAC	1569	GUGACCG	GCgaaagGCGaGuCaaGGuCU	AAAUAGG	4251
2946	UGAGCCU	G GAUUCAA	1572	UUUAUUG	GCgaaagGCGaGuCaaGGuCU	AGGUKCA	4252
2990	CUCACCC	G CACAGGA	1573	UCUUUGU	GCgaaagGCGaGuCaaGGuCU	GGUUGAG	4253
3012	GCAGGAG	G CGACAG	1574	CUGUUUG	GCgaaagGCGaGuCaaGGuCU	GUCCGCC	4254
3090	GCCTUAC	G CUCAGGC	1575	GCCTUAG	GCgaaagGCGaGuCaaGGuCU	GUAGAGC	4255
3113	ACAAUUG	G CGACAGC	1576	GCTUCUG	GCgaaagGCGaGuCaaGGuCU	ACAGUUG	4256
3132	CUCUCUCU	G CCUCUAC	1577	GUUGAGG	GCgaaagGCGaGuCaaGGuCU	AGAGGAG	4257
51	AGGACCCU	G UAUUUCC	1578	GGAAUAUA	GCgaaagGCGaGuCaaGGuCU	AGGGCCU	4258
106	AGAAUAU	G UCUUCGCC	1579	GGCAGAGA	GCgaaagGCGaGuCaaGGuCU	AGUAUUU	4259
148	GGAGCCU	G UACUAGC	1580	GUUCGUA	GCgaaagGCGaGuCaaGGuCU	AGGUCUC	4260
198	CUCUCUGU	G UACAGAC	1581	GCCTUUA	GCgaaagGCGaGuCaaGGuCU	ACGACAG	4261
219	UUUUUUU	G UUGACAA	1582	UUUGCAA	GCgaaagGCGaGuCaaGGuCU	AGAAAAA	4262

Table 40

297	ACACCCGU G UGUUUUG	1583	CCAGACGA GCCgaagGCCaGUCaAGUUCU ACAGGUGU	4263
299	ACCCGUGU G UGUUGGC	1584	GCACAGGA GCCgaagGCCaGUCaAGUUCU ACACGGGU	4264
347	ACACACCU G UGUUCCUC	1585	GGGACAA GCCgaagGCCaGUCaAGUUCU AGGUUGGU	4265
350	AACACUUGU G UGUUCCAA	1586	UUUGAGGA GCCgaagGCCaGUCaAGUUCU AACAGGUU	4266
362	UCCAAUUU G UGUUGGUU	1587	AACGAGA GCCgaagGCCaGUCaAGUUCU AAUUUGGA	4267
381	CCUGAGAU G UGUUGUG	1588	GCAGACA GCCgaagGCCaGUCaAGUUCU AUCCAGCG	4268
383	CUGAGUGU G UGUUGGCG	1589	GCACAGA GCCgaagGCCaGUCaAGUUCU ACACCCAG	4269
438	AUCUUCUU G UUGUUUUU	1590	AGAACAA GCCgaagGCCaGUCaAGUUCU AAGAGAU	4270
465	CAAGGUAU G UUGCCCGU	1591	AGCGCAA GCCgaagGCCaGUCaAGUUCU AUACUUUG	4271
476	GCCGUUUU G UCCUCCAA	1592	UUAGAGGA GCCgaagGCCaGUCaAGUUCU AAACGGGC	4272
555	ACUUCUAU G UUUUCCUC	1593	GGGGAAGA GCCgaagGCCaGUCaAGUUCU AUNGAGGU	4273
566	UCCUCUUN G UUGUGUUA	1594	UACAGCA GCCgaagGCCaGUCaAGUUCU AUGAGGGA	4274
572	AUGUGUCU G UACAAAC	1595	GUUUUGUA GCCgaagGCCaGUCaAGUUCU AUGACAU	4275
602	CUCACCUU G UAUUCCCA	1596	UUGGGAUA GCCgaagGCCaGUCaAGUUCU AGGUUGAG	4276
694	UCCCAUUU G UUCAGUGG	1597	CCACUGAA GCCgaagGCCaGUCaAGUUCU AAUUAGCA	4277
724	CCCGACCU G UGUUGCCU	1598	AGCCAGA GCCgaagGCCaGUCaAGUUCU AGUGGGGG	4278
750	UGGUAU G UGUUUUUG	1599	CAAAACCA GCCgaagGCCaGUCaAGUUCU AUCAUCCA	4279
771	CCAGGUUU G UACACAU	1600	AUUGUUA GCCgaagGCCaGUCaAGUUCU AGACUUGG	4280
801	AUCCGCUU G UUACCAU	1601	AUUGUA GCCgaagGCCaGUCaAGUUCU AGCGCAU	4281
818	UUGUUUUU G UGUUUGG	1602	CCCAAGA GCCgaagGCCaGUCaAGUUCU AAAAGAAA	4282
888	UGGUAU G UAUUUGGG	1603	CCCAUUA GCCgaagGCCaGUCaAGUUCU AUUACCA	4283
927	AACUAUUU G UACAAAAA	1604	UUUUUGUA GCCgaagGCCaGUCaAGUUCU AAUUUUUU	4284
944	AUCAAUUU G UGUUUUAG	1605	CUAAAACA GCCgaagGCCaGUCaAGUUCU AUUUUGAU	4285
946	CAAAUUGU G UUUUAGGA	1606	UCCUAAA GCCgaagGCCaGUCaAGUUCU ACAUUUG	4286
963	AAUUCUUU G UUAACAGG	1607	CCUUUGUA GCCgaagGCCaGUCaAGUUCU AGGAUUUG	4287
991	GAAGUAU G UCAACGAA	1608	UUUUUGUA GCCgaagGCCaGUCaAGUUCU AUACUUUU	4288
1002	AACUAUUU G UGGGUUUU	1609	AAGACCA GCCgaagGCCaGUCaAGUUCU AAUUUGGU	4289
1039	CAACCAU G UGGUAUUU	1610	AUAUCCA GCCgaagGCCaGUCaAGUUCU AUUGUGUG	4290
1137	AACGUAU G UGAACCUU	1611	AGGUUCA GCCgaagGCCaGUCaAGUUCU AUACUUUU	4291
1184	UCCCAUUU G UUUUGUA	1612	UACGAAA GCCgaagGCCaGUCaAGUUCU ACUUUGCA	4292
1251	GAACUUUU G UGUUCCUU	1613	AGGAGACA GCCgaagGCCaGUCaAGUUCU AAAGGUUC	4293
1253	AACAAUUU G UUUUUUUU	1614	AGAGAGA GCCgaagGCCaGUCaAGUUCU ACAAAAGU	4294
1294	AGCGUUU G UUUUGUCU	1615	GGGAAAA GCCgaagGCCaGUCaAGUUCU AGCGGCU	4295
1344	ACAAUUUU G UGUUGGUC	1616	GGGACGA GCCgaagGCCaGUCaAGUUCU AGAAUUUU	4296

Table 40

1390	GCUAGGCU G UGUUGCCA	1617	UGCGAGCA GCCgaagGCGaGuCaagGUCU AGCCUAGC	4297
1425	CGUCUUU G UUAUGUC	1618	GAGUAA GCCgaagGCGaGuCaagGUCU AAGGAGG	4298
1508	GCQUUUU G UACCGACC	1619	GUUGGUA GCCgaagGCGaGuCaagGUCU AAUAGGCG	4299
1557	CCCGGCUU G UGCUUUUC	1620	AGAAAGCA GCCgaagGCGaGuCaagGUCU AGCGGCGG	4300
1581	CGGACCGU G UGCACUUC	1621	GAUGUCA GCCgaagGCGaGuCaagGUCU AGCGGCGG	4301
1684	UAGACAAU G UCAAGGAC	1622	GUCCUUA GCCgaagGCGaGuCaagGUCU AUUGCUAA	4302
1721	CAAGACU G UUGUUUA	1623	UAAACAA GCCgaagGCGaGuCaagGUCU AGUCUUUG	4303
1729	AAGACUGU G UGUUUUA	1624	AUUAACA GCCgaagGCGaGuCaagGUCU ACAGUUUU	4304
1723	GAGUUUU G UUAUAGA	1625	UUAUAAA GCCgaagGCGaGuCaagGUCU ACACAGUC	4305
1772	AGGUUUU G UACUAGA	1626	UCCUAAA GCCgaagGCGaGuCaagGUCU AAGAGACU	4306
1785	AGAGACU G UAGGUNA	1627	UAUGCUA GCCgaagGCGaGuCaagGUCU AGCCUCCU	4307
1801	AAAUUGU G UGUUACCC	1628	GUUAACA GCCgaagGCGaGuCaagGUCU ACCAAUUU	4308
1803	AUUGUGU G UUCACACC	1629	CUUGUUA GCCgaagGCGaGuCaagGUCU ACNCCAAU	4309
1850	CAUCUAAU G UCAUUGUC	1630	GACUAAA GCCgaagGCGaGuCaagGUCU AUAAUUG	4310
1856	AUGUCAAU G UCCUACUG	1631	CAUUGGA GCCgaagGCGaGuCaagGUCU AUGAACAU	4311
1864	GUCCAAU G UCCAGACC	1632	GCUDUAA GCCgaagGCGaGuCaagGUCU AGUAGGAC	4312
1881	UCCAAACU G UGCUUUGG	1633	CGAAGCA GCCgaagGCGaGuCaagGUCU AGCUDGGA	4313
1939	GAGCUUCU G UGGAGUUA	1634	UAAUCCA GCCgaagGCGaGuCaagGUCU AGAAGCUC	4314
2013	UUCUCCU G UAUCCGCG	1635	CCCCGUA GCCgaagGCGaGuCaagGUCU AGAGCAGA	4315
2045	GGACAAU G UCAACCUU	1636	GAGUGAA GCCgaagGCGaGuCaagGUCU AAUGUCCU	4316
2082	CGAUUUU G UGUUGGGG	1637	CCCCACA GCCgaagGCGaGuCaagGUCU AGAUAGC	4317
2084	UAUUCUGU G UUGGGGUG	1638	CACCCCA GCCgaagGCGaGuCaagGUCU ACXGAUUA	4318
2167	UAUGCAU G UCAAGGUG	1639	AAUCCUGA GCCgaagGCGaGuCaagGUCU AUAGCUUA	4319
2205	CACUUAU G UGGUUAUA	1640	UGAAACA GCCgaagGCGaGuCaagGUCU AAUAGUUG	4320
2222	CAUUCUU G UCUUACUU	1641	AAUUAAGA GCCgaagGCGaGuCaagGUCU AGGAUUG	4321
2245	GAGAAACU G UCUUGAAA	1642	UUCUAAA GCCgaagGCGaGuCaagGUCU AGUUDUCC	4322
2262	UAUUGUGU G UCUUUGGG	1643	CGAAAGA GCCgaagGCGaGuCaagGUCU ACCAAUUA	4323
2274	UUUGAGU G UGUUUGGG	1644	CGAAUCCA GCCgaagGCGaGuCaagGUCU ACUCGAAA	4324
2344	AAACUACU G UUGUUAGA	1645	UCUAAACA GCCgaagGCGaGuCaagGUCU AGUAUUUU	4325
2347	CUACUUUU G UUGAGACA	1646	UUCUUAUA GCCgaagGCGaGuCaagGUCU AACUAUAG	4326
2450	AUCUCAU G UUGUAUUU	1647	AAUAUUA GCCgaagGCGaGuCaagGUCU AUUGAGAU	4327
2573	AGGACAUU G UUGAUGAA	1648	UCUAUCAA GCCgaagGCGaGuCaagGUCU AAUGUCCU	4328
2583	UGAUAGAU G UAGGCAAU	1649	AUUGCUUA GCCgaagGCGaGuCaagGUCU AUUCUACA	4329
2594	AGCAUUUU G UUGGGGCC	1650	GGCGCCCA GCCgaagGCGaGuCaagGUCU AAUUUGCU	4330

Table 40

2663	AUCCAAU G UUAUAA	1651	UUUAUAA GCgaaagGCGaGuCaAGuCU AUUGGAAU	4331
2717	CAGAGUAG G UAUUAU	1652	AUAUAUA GCgaaagGCGaGuCaAGuCU AUACUUG	4332
2901	AUUAUUCU G UCCCAAU	1653	AUUGGGA GCgaaagGCGaGuCaAGuCU AGAAGAU	4333
3071	GGGAGUCU G UUGGGUG	1654	CACCCCA GCgaaagGCGaGuCaAGuCU AGUCCCC	4334
3111	UACAACU G UGACAGA	1655	UGUGGGA GCgaaagGCGaGuCaAGuCU AGUUGA	4335
40	AUCCAGA G UGAGGAC	1656	GGCCUUA GCgaaagGCGaGuCaAGuCU UGUUGAU	4336
46	GAGUAGU G CCGUAC	1657	GUACAGG GCgaaagGCGaGuCaAGuCU CCGUACU	4337
65	UCCUGUCU G UGUUUC	1658	UGAGGUA GCgaaagGCGaGuCaAGuCU CAGCAGA	4338
68	UUCUGUGU G CUCAGAU	1659	AACUGAG GCgaaagGCGaGuCaAGuCU CACCAGA	4339
74	UGUGUCA G UUCAGAA	1660	UUCUGGA GCgaaagGCGaGuCaAGuCU UGAGCCA	4340
85	CGGAGUA G UGAGCCU	1661	AGGUCUA GCgaaagGCGaGuCaAGuCU UGUUCCU	4341
89	AACAGUA G CCUUCUC	1662	GAUCAGG GCgaaagGCGaGuCaAGuCU UCAUUCU	4342
120	GCAUAUUC G UCAAUUCU	1663	AAGAUAU GCgaaagGCGaGuCaAGuCU GAUAUGC	4343
196	CCUUGUCU G UGUACAG	1664	CUUAACA GCgaaagGCGaGuCaAGuCU CUGAGAG	4344
205	UGUACAG G CGAGAUU	1665	AAACCCG GCgaaagGCGaGuCaAGuCU CUUAAUA	4345
210	CAGGCGG G UUUUCUU	1666	AAGABAA GCgaaagGCGaGuCaAGuCU CCGGCCU	4346
248	ACACAGA G UCUAGAU	1667	AUUAAGA GCgaaagGCGaGuCaAGuCU UCUUUGU	4347
258	UAGAGUCU G UGUAGAC	1668	GUCCACA GCgaaagGCGaGuCaAGuCU GAUUCUAG	4348
261	GACUGUGU G UGAGUUC	1669	GAGUCCA GCgaaagGCGaGuCaAGuCU CAGAGUC	4349
295	GACAGCC G UGUUUCU	1670	AAGACUA GCgaaagGCGaGuCaAGuCU GGUUUCU	4350
305	UGUGUGU G CCAAAAU	1671	AUUUUUG GCgaaagGCGaGuCaAGuCU CAGACAC	4351
318	AUUAUGUA G UCCAAAU	1672	AUUUGGA GCgaaagGCGaGuCaAGuCU UGAGAAU	4352
332	AUUAUCA G UCAUCAC	1673	GUAGAUA GCgaaagGCGaGuCaAGuCU UGGAGAU	4353
368	UUGUUGU G UUAUGCU	1674	AUGUAUA GCgaaagGCGaGuCaAGuCU CAGAGAA	4354
390	UGUGUGU G GUUUUAU	1675	AUAUAAG GCgaaagGCGaGuCaAGuCU CGCAACA	4355
392	UUGUGGC G UUUUAUA	1676	UUAUAAA GCgaaagGCGaGuCaAGuCU CCGCAUA	4356
442	UCUUGUGU G UUCUUCU	1677	CAGAAUA GCgaaagGCGaGuCaAGuCU CAACAAG	4357
461	CUAUCAG G UAUUUAU	1678	CGAACUA GCgaaagGCGaGuCaAGuCU CUUGAUA	4358
472	UUGUGCC G UUGUUCU	1679	AGACAAA GCgaaagGCGaGuCaAGuCU GGCACAA	4359
506	AACACUA G CACUGAC	1680	GUCCGAG GCgaaagGCGaGuCaAGuCU UGUUUUU	4360
625	CAUCUGU G CUDUGUA	1681	UUGCAAG GCgaaagGCGaGuCaAGuCU CCAAGAU	4361
648	AUUGGGA G UGAGGCU	1682	GAGGCCA GCgaaagGCGaGuCaAGuCU UCCCAUG	4362
652	GAGAGUG G CUCAGUC	1683	GAUUAAG GCgaaagGCGaGuCaAGuCU CCACUCC	4363
658	GGGCUUA G UCCGUUC	1684	GAACGGA GCgaaagGCGaGuCaAGuCU UGAGCCC	4364

Table 40

662	CUCAGUCC G UUUUCUUU	1685	AAGAGAAA GCCgaagGCGaGuCaaGGUcU	GGACUGAG	4365
672	UUUCUUGG G CUUACUUU	1686	AAACUAG GCCgaagGCGaGuCaaGGUcU	CAAGAGAA	4366
677	UUGGCUCA G UUUAUAG	1687	CUAGUAAA GCCgaagGCGaGuCaaGGUcU	UGAGCCAA	4367
685	GUUUACA G UGCCAUUU	1688	AAAUUGCA GCCgaagGCGaGuCaaGGUcU	UNGUAAAC	4368
699	UUUUUTCA G UGUUUUG	1689	ACGAACCA GCCgaagGCGaGuCaaGGUcU	UGAACAAAC	4369
702	GUUCAGU G UUGGUAGG	1690	CCUACGAA GCCgaagGCGaGuCaaGGUcU	CACUGAAC	4370
706	AGUGGUC G UAGGCGUU	1691	AAGCCCUA GCCgaagGCGaGuCaaGGUcU	GAACACCU	4371
711	CUUUGAGG G CUUUCCCC	1692	GGGHAAG GCCgaagGCGaGuCaaGGUcU	CCUACGAA	4372
729	ACUGUCUG G CUUUCAGU	1693	ACUAGAA GCCgaagGCGaGuCaaGGUcU	CAGACAGU	4373
736	GGGCGCAA G UUUAUUG	1694	CCAUUAAA GCCgaagGCGaGuCaaGGUcU	UGAAAGCC	4374
753	AUGUUGG G UUUGGGGG	1695	CCCCAAAA GCCgaagGCGaGuCaaGGUcU	CACAUCAU	4375
762	UUUUGGG G CCAAGUCU	1696	AGACUUGG GCCgaagGCGaGuCaaGGUcU	CCCCAAAA	4376
767	GGGCGCAA G UCUUGUUA	1697	UGUACAGA GCCgaagGCGaGuCaaGGUcU	UUUGCCCC	4377
785	GUUCUUGA G UCCUUUUA	1698	UAAACGGA GCCgaagGCGaGuCaaGGUcU	UUAAGUG	4378
826	GUUCUUGA G UUAUUAUU	1699	AUUGUAAA GCCgaagGCGaGuCaaGGUcU	CCAAAGAC	4379
898	AUUUGGGA G UUGGGGCA	1700	UGCCCCAA GCCgaagGCGaGuCaaGGUcU	UCCCAUUU	4380
904	GGUUGGGG G CACAUUUC	1701	GGAAUUGG GCCgaagGCGaGuCaaGGUcU	CCCAACUC	4381
971	GUAAACAG G CCUUUUGA	1702	UCAAUAGG GCCgaagGCGaGuCaaGGUcU	CUUUTUAC	4382
987	AUUGGAAA G UUUUGUAA	1703	UUGACAAA GCCgaagGCGaGuCaaGGUcU	UUUCCAAU	4383
1006	AUUUGUG G UUUUUUGG	1704	CCAAAAGA GCCgaagGCGaGuCaaGGUcU	CCCAAUUU	4384
1016	CUUUUGGG G UUUGCCCG	1705	GGGCGAAA GCCgaagGCGaGuCaaGGUcU	CCCAAAAG	4385
1080	GAUAACAA G UAAAACAG	1706	CUUUUUUG GCCgaagGCGaGuCaaGGUcU	UUUGUAGC	4386
1089	CAAAACAG G CUUUUAUU	1707	AGUAAAAG GCCgaagGCGaGuCaaGGUcU	CUUUUUUG	4387
1116	GUUACAGG G CCUUUUAU	1708	UAGAAGGG GCCgaagGCGaGuCaaGGUcU	CUUUGUAG	4388
1126	UUUUUAAA G UAAACAGU	1709	ACUUUUUA GCCgaagGCGaGuCaaGGUcU	UUGAAUAG	4389
1133	AGUAAACA G UUUAUGBA	1710	UUUACAAA GCCgaagGCGaGuCaaGGUcU	UUUUUUUU	4390
1152	UUUACCCC G UUUCUUGG	1711	CCGAGCAA GCCgaagGCGaGuCaaGGUcU	GGGUGAAA	4391
1160	GUUGUCUG G CAACGGCC	1712	GGCCUUGG GCCgaagGCGaGuCaaGGUcU	CGAGUAAAC	4392
1166	CGGCAACG G CCUGGUUU	1713	AGACGAGG GCCgaagGCGaGuCaaGGUcU	CGUUGCCG	4393
1171	ACGGGUCU G UCUAUGCC	1714	GGCUUAGA GCCgaagGCGaGuCaaGGUcU	CAGGCUUU	4394
1182	UUUUGCCAA G UGUUUUGU	1715	AGCAACAA GCCgaagGCGaGuCaaGGUcU	UUUGGCUUA	4395
1207	CCCAACUG G UUUGGGGU	1716	AGCCCCAA GCCgaagGCGaGuCaaGGUcU	CAGUUGGG	4396
1213	UGUUGGG G UUUGGACA	1717	UGGCGAAG GCCgaagGCGaGuCaaGGUcU	CCCAACCA	4397
1218	GGGGUUG G CCUAGGCG	1718	GCCUUUGG GCCgaagGCGaGuCaaGGUcU	CNAGCCCC	4398

Table 40

1225	GGCCAUAG	G	CCAUACAG	1719	GCUGAUGG	GCcgaagGCGaGuCaaGGuCu	CUAUgGCC	4399
1232	GGCAUCA	G	GGCAUGG	1720	GGCAUGCG	GCcgaagGCGaGuCaaGGuCu	UGAUgGCC	4400
1240	GGCAUAG	G	UGGAACU	1721	AGUUUCA	GCcgaagGCGaGuCaaGGuCu	GCUAUGCC	4401
1267	AAUCCUA	G	CCGCUUG	1722	ACGAAGCG	GCcgaagGCGaGuCaaGGuCu	UAGGAGUU	4402
1306	UGUCCUA	G	CAGGCUG	1723	CAGACCUG	GCcgaagGCGaGuCaaGGuCu	UGCGAGAA	4403
1310	GGCAGAG	G	UUGAGGC	1724	GGCCAGGA	GCcgaagGCGaGuCaaGGuCu	CUUGUGCG	4404
1317	GGUUGG	G	CAAAACU	1725	GAGUUGG	GCcgaagGCGaGuCaaGGuCu	CCCAAGCC	4405
1347	AUUCUGC	G	UGUCUUC	1726	GGAGGCA	GCcgaagGCGaGuCaaGGuCu	GACAGAU	4406
1379	UUUCCAG	G	CUGCUAG	1727	CCUAGCAG	GCcgaagGCGaGuCaaGGuCu	CAUGGAAA	4407
1387	GGUUGAG	G	CUGUGUG	1728	CAGACACG	GCcgaagGCGaGuCaaGGuCu	CUAGCAGC	4408
1418	GGGGGAC	G	UUCUUUU	1729	ACAAAGGA	GCcgaagGCGaGuCaaGGuCu	GUUCCGCG	4409
1431	UGUUUAC	G	UCCGUGG	1730	GCACGGGA	GCcgaagGCGaGuCaaGGuCu	GUAAACAA	4410
1436	UACGUCG	G	UCCGUGG	1731	AGCCCGCA	GCcgaagGCGaGuCaaGGuCu	GGGACGUA	4411
1440	UCCGUGG	G	CGCUGAU	1732	AUUCAGCG	GCcgaagGCGaGuCaaGGuCu	CGACCGGA	4412
1471	CUCCGGG	G	CGGCUUG	1733	CCAAAGCG	GCcgaagGCGaGuCaaGGuCu	CCCGGAGG	4413
1481	GGUUGG	G	UUUACCG	1734	CGGUAAG	GCcgaagGCGaGuCaaGGuCu	CCCAAGUG	4414
1517	UACGAGC	G	UCCACGG	1735	CCCGUGGA	GCcgaagGCGaGuCaaGGuCu	GGGCGGUA	4415
1526	UACAGGG	G	CGCACCU	1736	GAGUGCG	GCcgaagGCGaGuCaaGGuCu	CCGCUUGA	4416
1553	GAUCCGC	G	UUUGUCC	1737	GGCACAGA	GCcgaagGCGaGuCaaGGuCu	GGGAGUUC	4417
1579	CGCGACC	G	UUUGACU	1738	AGUCCACA	GCcgaagGCGaGuCaaGGuCu	GGUCCGAG	4418
1605	CUUGGAC	G	UUGGAUG	1739	CCAUUGCA	GCcgaagGCGaGuCaaGGuCu	GUUCAGAG	4419
1622	AGACACC	G	UGAACGCC	1740	GGCGUCCA	GCcgaagGCGaGuCaaGGuCu	GGGUGUCU	4420
1649	UGCCCAAG	G	UUUGCAU	1741	AUCCAGGA	GCcgaagGCGaGuCaaGGuCu	CUUGGCGA	4421
1679	GACUCCA	G	CAUUCUA	1742	UGACAUUG	GCcgaagGCGaGuCaaGGuCu	UGAAAGUUC	4422
1703	ACUUGAG	G	CAUUCUC	1743	GAUUAUG	GCcgaagGCGaGuCaaGGuCu	CUCAAGUU	4423
1732	UUUAUAGA	G	UGGAGGA	1744	UCUCCCCA	GCcgaagGCGaGuCaaGGuCu	UUAUUAUA	4424
1741	UGGAGGA	G	UUGGGGA	1745	UCCUCCAA	GCcgaagGCGaGuCaaGGuCu	UCCUCCCA	4425
1754	GGCAGAG	G	UUGAGUA	1746	UAAUCCUA	GCcgaagGCGaGuCaaGGuCu	CCUCCUCC	4426
1759	GAGUUGG	G	UUAAGUU	1747	ACCUUUA	GCcgaagGCGaGuCaaGGuCu	CUAACCUUC	4427
1766	GGUUAAG	G	UUUUUUA	1748	UACAAAGA	GCcgaagGCGaGuCaaGGuCu	CUUUAACC	4428
1782	ACTUAGAG	G	CUGUAGC	1749	GGCUACAG	GCcgaagGCGaGuCaaGGuCu	CUCUUAUU	4429
1789	GGCUUAG	G	CAUUAUU	1750	AAUUAUUG	GCcgaagGCGaGuCaaGGuCu	CUACAGCC	4430
1799	AUAACUA	G	UUUGUUA	1751	UGAACACA	GCcgaagGCGaGuCaaGGuCu	CAUUAUAU	4431
1811	GUUACCA	G	CACCAUGC	1752	GGAUUGUG	GCcgaagGCGaGuCaaGGuCu	UGGUUAC	4432

Table 40

1870	CUUUCUCAA G CCUCCAAAG	1783	CUUGAGG GC CGAaagGCGaGUCaAGGUCU	UTGAAACAG	4433
1878	GCUCUCAA G CUUURCU	1784	AGSCACAG GC CGAaagGCGaGUCaAGGUCU	UUGAAGGC	4434
1890	UCCUUGG G UUGCUUUG	1785	CAAGACCA GC CGAaagGCGaGUCaAGGUCU	CGAAGGCA	4435
1893	CUUGGUGG G CUUUGGGG	1786	CCCCAAAG GC CGAaagGCGaGUCaAGGUCU	CACCCAAAG	4436
1901	GCUUUUGG G CAUUGACA	1787	UUCUCUAG GC CGAaagGCGaGUCaAGGUCU	CCCAAAAG	4437
1917	AUUGACCC G UAUAAAGA	1788	UCUUUAUA GC CGAaagGCGaGUCaAGGUCU	GGUICAAU	4438
1933	AUUUUGA G CUUCUUG	1789	CAAGAG GC CGAaagGCGaGUCaAGGUCU	UCCNAUUG	4439
1944	CUUUUGA G UUAUCUC	1790	GGAGUAA GC CGAaagGCGaGUCaAGGUCU	UCCACAA	4440
2023	AUCGGGGG G CCUUGAG	1791	CUUCAAG GC CGAaagGCGaGUCaAGGUCU	CCCCCGAU	4441
2031	CCUUUAGA G UUCUUGA	1792	UCCGAGA GC CGAaagGCGaGUCaAGGUCU	UUCUAGGC	4442
2062	ACNUAGG G CACUCCAG	1793	CCUGAGUG GC CGAaagGCGaGUCaAGGUCU	CGUATGUG	4443
2070	GCACUAG G CAAUCUUA	1794	AUAGCUG GC CGAaagGCGaGUCaAGGUCU	CUAGGUG	4444
2074	UGACGCA G CUUAUCUG	1795	CXGAAUAG GC CGAaagGCGaGUCaAGGUCU	UUGCCUGA	4445
2090	GUUUGGG G UGAGUUGA	1796	UCAAUCUA GC CGAaagGCGaGUCaAGGUCU	CCCAACAC	4446
2094	UGAGUUGA G UGAGUUA	1797	UUCUAUCA GC CGAaagGCGaGUCaAGGUCU	UCCACCCA	4447
2107	UGAAUUA G CCACUUG	1798	CCAGUGG GC CGAaagGCGaGUCaAGGUCU	UAGAUUA	4448
2116	CCACUUGG G UUGGAAGU	1799	ACTUCCCA GC CGAaagGCGaGUCaAGGUCU	CCAGGUG	4449
2123	GGUGGAA G UAUUUUG	1770	CCAAAUUA GC CGAaagGCGaGUCaAGGUCU	UUGCCACG	4450
2140	AAGAUA G CAUCCAG	1771	CTUGAUG GC CGAaagGCGaGUCaAGGUCU	UGGAUCU	4451
2155	GGGAUA G UAGUCAG	1772	GCTUACUA GC CGAaagGCGaGUCaAGGUCU	UAAUCCG	4452
2158	AUUUUA G UCAUCAU	1773	AUAUCUA GC CGAaagGCGaGUCaAGGUCU	UACUAAU	4453
2162	AGUAGUA G CUAGUUA	1774	UGACUAG GC CGAaagGCGaGUCaAGGUCU	UUGUACU	4454
2173	AUGUAC G UUAUUAU	1775	CAUAUUA GC CGAaagGCGaGUCaAGGUCU	UUGZACAU	4455
2183	UAUAUUG G CUUAAUA	1776	UUUUUAG GC CGAaagGCGaGUCaAGGUCU	CCUAUUA	4456
2208	CUUAUUG G UUUACAU	1777	AUGUAAA GC CGAaagGCGaGUCaAGGUCU	CNAUAG	4457
2235	ACTUUUGG G CUGAACA	1778	GUUUCUG GC CGAaagGCGaGUCaAGGUCU	CCAAAAGU	4458
2260	AUAUAUG G UUGUUUU	1779	AAAAGACA GC CGAaagGCGaGUCaAGGUCU	CCAAUAU	4459
2272	CUUUUGA G UUGUUAU	1780	AUUCACA GC CGAaagGCGaGUCaAGGUCU	UCCAAAG	4460
2360	ACGAAGG G CAGUCCG	1781	GGGACUUG GC CGAaagGCGaGUCaAGGUCU	CUUCUUGU	4461
2364	AGAGGAG G UCCCUAG	1792	CUAGGGGA GC CGAaagGCGaGUCaAGGUCU	CUUGUCU	4462
2403	AGACGAG G UUCUUAU	1783	GAUUGAGA GC CGAaagGCGaGUCaAGGUCU	CUUCUUGU	4463
2417	AUCGCGG G UUCGAGA	1784	UUUCUGA GC CGAaagGCGaGUCaAGGUCU	CGCGCUU	4464
2454	CAUUAUA G UAUUCU	1785	AAGGAUA GC CGAaagGCGaGUCaAGGUCU	UAAACUG	4465
2474	CACUAAG G UUGAAMC	1786	GUUUCCCA GC CGAaagGCGaGUCaAGGUCU	CUUAUUG	4466

Table 40

2491	UTUACGG	g	CUUUAUUC	1787	GAUUAAG	GCcgaagGCGaGcCaAGGNC	CCCGUAAA	4467
2507	CUUUAAG	g	UACUUAUC	1788	GCAAGGUA	GCcgaagGCGaGcCaAGGNC	CGUAGAAG	4468
2530	CUUAUUG	g	CAUAUUC	1789	GGAUUUG	GCcgaagGCGaGcCaAGGNC	CAUUAUAG	4469
2587	UAUUGG	g	CAUUAUUC	1790	ACNAUUG	GCcgaagGCGaGcCaAGGNC	UUACAUUC	4470
2599	CCUUAAG	g	CCCUUAUC	1791	GUUAGG	GCcgaagGCGaGcCaAGGNC	CCGCAAAA	4471
2609	CCUUAUA	g	UUAUUGA	1792	UUAUUAU	GCcgaagGCGaGcCaAGGNC	UUAUAGG	4472
2650	CUUGUAG	g	UUUAUUC	1793	GAUUAUA	GCcgaagGCGaGcCaAGGNC	CUUAGCAG	4473
2701	AUUAUAC	g	UUUAUUC	1794	GAUUAUA	GCcgaagGCGaGcCaAGGNC	GGUUUAU	4474
2713	UUUAUUA	g	UUUAUUG	1795	ACUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUGUAUA	4475
2720	UUUAUUA	g	UUUAUUA	1796	AUUAUAU	GCcgaagGCGaGcCaAGGNC	UUAUAUUA	4476
2768	UUUAUUA	g	GGGUAUC	1797	GUUCCCG	GCcgaagGCGaGcCaAGGNC	CUUCCAAA	4477
2791	AAUUAUA	g	UUUAUUA	1798	CGUUUGUA	GCcgaagGCGaGcCaAGGNC	UUUUUUUU	4478
2799	GUUAUAUA	g	UUUAUUA	1799	AGGCGUA	GCcgaagGCGaGcCaAGGNC	GUUGGUAU	4479
2802	CAUAUAUA	g	CCCUUAU	1800	AUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUAUAUUA	4480
2818	UUUAUUA	g	UUUAUUA	1801	UAUUAUA	GCcgaagGCGaGcCaAGGNC	CCGCAAAA	4481
2848	GUUAUAUA	g	UUUAUUA	1802	CUUCCUAU	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4482
2857	GUUAUAUA	g	UUUAUUA	1803	AAUUAUA	GCcgaagGCGaGcCaAGGNC	CUUCCUAU	4483
2861	GUUAUAUA	g	UUUAUUA	1804	UUUAUAUA	GCcgaagGCGaGcCaAGGNC	CAUCCUAU	4484
2881	UUUAUAUA	g	UUUAUUA	1805	UUCCUAU	GCcgaagGCGaGcCaAGGNC	CUUUAUUA	4485
2936	GUUAUAUA	g	UUUAUUA	1806	GGUUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4486
2955	UUUAUAUA	g	UUUAUUA	1807	UUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4487
2964	CAUAUAUA	g	UUUAUUA	1808	UUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4488
3005	GUUAUAUA	g	UUUAUUA	1809	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4489
3021	CAUAUAUA	g	UUUAUUA	1810	CUUUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4490
3027	GUUAUAUA	g	UUUAUUA	1811	UUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4491
3033	GUUAUAUA	g	UUUAUUA	1812	CCGUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4492
3041	GUUAUAUA	g	UUUAUUA	1813	AAUUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4493
3047	GUUAUAUA	g	UUUAUUA	1814	GGGUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4494
3077	GUUAUAUA	g	UUUAUUA	1815	GGGUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4495
3082	GUUAUAUA	g	UUUAUUA	1816	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4496
3097	GUUAUAUA	g	UUUAUUA	1817	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4497
3117	GUUAUAUA	g	UUUAUUA	1818	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4498
3120	GUUAUAUA	g	UUUAUUA	1819	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4499
3146	GUUAUAUA	g	UUUAUUA	1820	GUUAUAUA	GCcgaagGCGaGcCaAGGNC	UUUAUAUUC	4500

Table 40

3149	AUUGGCA G UCAGGAG	1821	CUUCCUGA GCGaaagCGaG/CaaGGuCu	UGCCGAU	4501
3158	UCAGGAAG G CAGCUAC	1822	GUAGGUG GCGaaagCGaG/CaaGGuCu	CUUCUGA	4502
3161	GGAAGCA G CCUACUC	1823	GCAUAGG GCGaaagCGaG/CaaGGuCu	UGCCUUC	4503
3204	AUCCUG G CCAUGCAG	1824	CUGCCUG GCGaaagCGaG/CaaGGuCu	CUAGGAU	4504

Input Sequence = AF100308. Cut Site = YG/M or UG/U.
 Stem Length = 8. Core Sequence = GCGaaagCGaG/CaaGGuCu
 AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 41

Table 41: Human HBV DNAzyme and Substrate Sequence

Pos	Substrate	Seq ID	DNAzyme	Rs Seq ID
508	CAACCAGC A CCGACCA	833	TGGTCCGG GGCTAGCTACAACGA GCTGGTTG	4505
1632	GAACGCCC A CAGGAACC	1096	GGTTCTCG GGCTAGCTACAACGA GGGCGTTC	4506
2992	CAACCCGC A CAAGGACA	1376	TGTCCTTG GGCTAGCTACAACGA GCGGGTTG	4507
61	ACUUCUCU G CUGUGUGC	1448	GCCACCAG GGCTAGCTACAACGA AGGAAAGT	4508
94	UGAGCCCU G CUCAGAAU	1450	ATTCTGAG GGCTAGCTACAACGA AGGGCTCA	4509
112	CUGUCUCU G CCAUAUCG	1451	CGATATGG GGCTAGCTACAACGA AGAGACAG	4510
169	AGAAACUC G CAUCAGGA	1454	TCCTGATG GGCTAGCTACAACGA GATGTCTT	4511
192	GGACCCCU G CUCUGUUU	1455	AACACGAG GGCTAGCTACAACGA AGGGGTCC	4512
315	CAAAAUUC G CAGUCCCA	1457	TGGGACTG GGCTAGCTACAACGA GAATTTTG	4513
374	UGGUUAUC G CUGAGUAU	1458	ACATCCAG GGCTAGCTACAACGA GATAACCA	4514
387	AUGUGUCU G CCGCGUUU	1459	AAACGCGG GGCTAGCTACAACGA AGACACAT	4515
410	CUUCUCUC G CAUCCUCC	1460	GCAGGATG GGCTAGCTACAACGA AGAGGAAG	4516
417	UGCAUCCU G CUCUUAUC	1461	CATAGCAG GGCTAGCTACAACGA AGGATGCA	4517
420	AUCCUCCU G CUUUGCCU	1462	AGGCATAG GGCTAGCTACAACGA AGCAGGAT	4518
425	GCGUCUAU G CCUCAUCU	1463	AGATGAGG GGCTAGCTACAACGA ATAGCAGC	4519
468	GGUAUGUU G CCGGUUUG	1464	CAACGGGG GGCTAGCTACAACGA AACATACC	4520
518	CGGACCAU G CAAACCCU	1465	AGGTTTGG GGCTAGCTACAACGA ATGGTCCG	4521
527	CAAAACCU G CUCAACUC	1466	GAGTTTGG GGCTAGCTACAACGA AGGTTTGG	4522
538	CAACUCCU G CUCAAGGA	1467	TCCTTGAG GGCTAGCTACAACGA AGGAGTTG	4523
569	CGCAUGUU G CUGUACAA	1468	TGTGACAG GGCTAGCTACAACGA AACATGAG	4524
596	CUGAAACU G CACCUUGA	1469	TACAGGTG GGCTAGCTACAACGA AGTTTCCG	4525
631	GGGCUUUC G CAAAUUAG	1470	GTATTTTG GGCTAGCTACAACGA GAAAGCCC	4526
687	UAUCUAGU G CCAUUGUJ	1471	ACAAATGG GGCTAGCTACAACGA ACTAGTAA	4527
795	CCCUUUAU G CCGCUGUU	1474	AACAGCGG GGCTAGCTACAACGA ATAAAGGG	4528
798	UUUAUGCC G CUGUUAAC	1475	GGTAACAG GGCTAGCTACAACGA GGCATAAA	4529
911	GGCACAUU G CCACAGGA	1476	TCCTGTGG GGCTAGCTACAACGA AATGTGCC	4530
1020	UGGGUUUU G CCGCCCCU	1479	AGGGGGGG GGCTAGCTACAACGA AAACCCCA	4531
1023	GGUUUGCC G CCCUUUUC	1480	GAAAGGGG GGCTAGCTACAACGA GGCACAA	4532
1034	CCUUUCAC G CAAUGUGG	1481	CCACATTG GGCTAGCTACAACGA GTGAAAGG	4533
1050	GAUUAUUC G CUUUAAGU	1482	CATTAAAG GGCTAGCTACAACGA AGAATATC	4534
1058	CGUUUAUU G CCUUUAUA	1483	TATAAAGG GGCTAGCTACAACGA ATTAAGC	4535
1068	CUUUUAUU G CAUGCAUA	1484	TATGCATG GGCTAGCTACAACGA ATATAAG	4536
1072	AUAUGCAU G CAUACAAG	1485	CTTGATG GGCTAGCTACAACGA ATGCATAT	4537
1103	ACUUUCUC G CCAACUUA	1486	TAAAGTTG GGCTAGCTACAACGA GAGAAAGT	4538
1155	ACCCGCUU G CUCGGCAA	1488	TTGCGGAG GGCTAGCTACAACGA AACGGGGT	4539
1177	UGGUCUAU G CCAAGUGU	1489	ACACTTGG GGCTAGCTACAACGA ATAGACCA	4540
1188	AAGUGUUU G CUGACGCA	1490	TGCGTCAG GGCTAGCTACAACGA AAACACTT	4541
1194	UUGUGACU G CAACCCCC	1492	GCGGGTTG GGCTAGCTACAACGA GTCAGCAA	4542
1234	CCAUCAGC G CAUGCGUG	1493	CACGCATG GGCTAGCTACAACGA GCTGATGG	4543
1238	CACGCAU G CGUGGAAC	1494	GTTCACGG GGCTAGCTACAACGA ATGGCTG	4544
1262	UCUUCUCU G CCGAUCCA	1495	TGGATCGG GGCTAGCTACAACGA AGAGGAGA	4545
1275	UCCAUUAC G CGGAACUC	1497	GAGTTCGG GGCTAGCTACAACGA GGATAGGA	4546
1290	UCCUAGCC G CUGUGUUU	1498	AAACAAGG GGCTAGCTACAACGA GGCTAGGA	4547
1299	CUUGUUUU G CUCGCAGC	1499	GCTGCGAG GGCTAGCTACAACGA AAAACAAG	4548
1303	UUUUGCUC G CACGAGGU	1500	ACCTGCTG GGCTAGCTACAACGA GAGCAAAA	4549
1349	UUUGAGUG G CUCUCCCG	1502	CGGAGAGG GGCTAGCTACAACGA ACACACGA	4550
1357	GCUCUCCC G CAAAUUAU	1503	TATATTTG GGCTAGCTACAACGA GGGAGAGC	4551

Table 41

1382	CCAAGGCG	G	CUAGGCGG	1504	CAGCCTAG	GGCTAGCTACAACGA	AGCCATGG	4552
1392	UAGGCGUG	G	CUGCCAAC	1505	GTTGGCAG	GGCTAGCTACAACGA	ACAGCCTA	4553
1395	GCUCUGUG	G	CCAACUUG	1506	CCAGTTGG	GGCTAGCTACAACGA	ACACACGC	4554
1411	GAUUCUAC	G	CGGGACGU	1507	ACGTCCCG	GGCTAGCTACAACGA	GTAGGATC	4555
1442	CGUCGCGG	G	CUGAUUCC	1508	GGATTTCAG	GGCTAGCTACAACGA	GCGACGGG	4556
1452	UGAAUCCC	G	CGGACGAC	1510	GTCGTCCG	GGCTAGCTACAACGA	GGATTCCA	4557
1474	CGGGGGCC	G	CUUGGGGG	1512	GCCCCAAG	GGCTAGCTACAACGA	GCCCCGGG	4558
1489	GCUCUACG	G	CCCOCUJC	1513	GAAGCGGG	GGCTAGCTACAACGA	GGTAGAGC	4559
1493	UACGCGCC	G	CUUCUCOG	1514	CGAGAGAG	GGCTAGCTACAACGA	GGCGGTGA	4560
1501	GCUCUCCC	G	CCUAIUUG	1515	ACAATAGG	GGCTAGCTACAACGA	GGAGAAGC	4561
1528	CACGGGGC	G	CACUCUC	1517	GAGAGGTG	GGCTAGCTACAACGA	GCCCCGTG	4562
1542	CUUUCUAC	G	CGGACUCC	1518	GGAGTCCG	GGCTAGCTACAACGA	GTAAGAGG	4563
1559	CCGUCUGU	G	CCUUCUCA	1519	TGAGAAGG	GGCTAGCTACAACGA	ACAGACGG	4564
1571	UCUCUACU	G	CCUGGACG	1520	CGGTCCGG	GGCTAGCTACAACGA	AGATGAGA	4565
1583	GACCGUGU	G	CACUUCGC	1521	GCGAAGTG	GGCTAGCTACAACGA	ACACGGTC	4566
1590	UGCACUUC	G	CCUCACUC	1522	AGGTGAAG	GGCTAGCTACAACGA	GAAGTGCA	4567
1601	UCACCCUC	G	CACUCGCG	1523	GCAGCGTG	GGCTAGCTACAACGA	AGAGGTGA	4568
1608	UCGACGUC	G	CAUGGAGA	1524	TCTCCATG	GGCTAGCTACAACGA	GACGTGCA	4569
1628	CCUGGAAAC	G	CCCAAGG	1526	CCTGTGGG	GGCTAGCTACAACGA	GTTCACTG	4570
1642	AGGAACCU	G	CCCAAGGU	1527	ACCTTGGG	GGCTAGCTACAACGA	AGTTCCTC	4571
1654	AGGGUCUU	G	CAAAAGAG	1528	CTCTTATG	GGCTAGCTACAACGA	AGACCTTT	4572
1818	AGCAACCAU	G	CAACUUUU	1533	AAAAGTTG	GGCTAGCTACAACGA	ATGGTGCT	4573
1835	UCACCCUC	G	CCUUAUCA	1534	TGATTAGG	GGCTAGCTACAACGA	AGAGGTGA	4574
1883	CAAGCUGU	G	CCUGGGGU	1535	ACCCAAGG	GGCTAGCTACAACGA	ACAGCTTG	4575
1959	UCUUUUUU	G	CCUUCUGA	1537	TCAGAAGG	GGCTAGCTACAACGA	AAAAAAGA	4576
2002	UCGACACC	G	CCUCUGUG	1541	AGCAGAGG	GGCTAGCTACAACGA	GGTGTCGA	4577
2008	CCGCGUUC	G	CUCUGUAU	1542	ATACAGAG	GGCTAGCTACAACGA	AGAGGCGG	4578
2282	GUGGAUUC	G	CACUCCUC	1548	GAGGAGTG	GGCTAGCTACAACGA	GAATCCAC	4579
2293	CUCCUCCU	G	CAUAUAGA	1549	TCTATATG	GGCTAGCTACAACGA	AGGAGGAG	4580
2311	CACCAAAU	G	CCCUCUAC	1550	GATAGGGG	GGCTAGCTACAACGA	ATTTGGTG	4581
2388	ACUCUCCU	G	CCUCGACG	1552	CTGCGAGG	GGCTAGCTACAACGA	GAGGGAOT	4582
2393	CUCGCCUC	G	CAGACGAA	1553	TTCGTCTG	GGCTAGCTACAACGA	GAGGCGAG	4583
2412	UCUCAAUC	G	CCGCGUCC	1555	CGACGCGG	GGCTAGCTACAACGA	GATTGAGA	4584
2415	CAUUCGCG	G	CGUGCGAG	1556	CTGCGACG	GGCTAGCTACAACGA	GCGATTG	4585
2420	GCCGCGUC	G	CAGAAGAU	1557	ATCTTCTG	GGCTAGCTACAACGA	GACGCGGG	4586
2514	GGUAUCCU	G	CUUUAUUC	1558	GATTAAAG	GGCTAGCTACAACGA	AAAGTACC	4587
2560	AUUCUATU	G	CAGGAGGA	1560	TCTCTCTG	GGCTAGCTACAACGA	AAATGAAT	4588
2641	UUAUUAU	G	CCUCUACG	1563	CTAGCAGG	GGCTAGCTACAACGA	ATAGTTAA	4589
2645	CUAGCUCU	G	CUAGGUUU	1564	AAACCTAG	GGCTAGCTACAACGA	AGGCATAG	4590
2677	AAUUAUUU	G	CCUUAUAG	1565	TCTAAGGG	GGCTAGCTACAACGA	AAATATTT	4591
2740	UUCGACAG	G	CGACAUUA	1566	TAAATGTC	GGCTAGCTACAACGA	GTCTGGAA	4592
2804	CCGUAAGC	G	CCUUAUUU	1568	AAATGAGG	GGCTAGCTACAACGA	GATACGGT	4593
2814	UCUAUUUU	G	CGGGUACG	1569	GTCAGCCG	GGCTAGCTACAACGA	AAATGAGG	4594
2946	GUGAACCU	G	CAUUCAAA	1572	TTTGAATG	GGCTAGCTACAACGA	AGGTTCCA	4595
2990	CUCAACCC	G	CACAAGGA	1573	TCCTTGTG	GGCTAGCTACAACGA	GGGTTGAG	4596
3012	GGCCGGAC	G	CCAACAAG	1574	CTTGTGTT	GGCTAGCTACAACGA	GTCCGGCC	4597
3090	GCCUCUAC	G	CCUAGGGC	1575	GCCCTGAG	GGCTAGCTACAACGA	GTTAGGGC	4598
3113	ACCAUUGU	G	CCAAGCAG	1576	GCTGTGGT	GGCTAGCTACAACGA	ACAGTTGT	4599
3132	CUUCUCCU	G	CCUCCACC	1577	GGTGGAGG	GGCTAGCTACAACGA	AGGAGGAG	4600
51	AGGGCCCU	G	UACUUUCC	1578	GGAAAGTA	GGCTAGCTACAACGA	AGGCGCCT	4601
106	AGAAUACU	G	UCUCUGCC	1579	GGCAGAGA	GGCTAGCTACAACGA	AGTATTCT	4602

Table 41

148	GGGACCCU G UACCGAAC	1580	GTTCGGTA GGCTAGCTACAACGA AGGGTCCC	4603
198	CUGCUCGU G UUCACAGC	1581	GCCTGTAA GGCTAGCTACAACGA ACGAGCAG	4604
219	UUUUUUUU G UUGACAAA	1582	TTTGTCAA GGCTAGCTACAACGA AAAAAAAA	4605
297	ACACCCGU G UGUCUGGG	1583	CCAAGACA GGCTAGCTACAACGA ACGGTGT	4606
299	ACCCUGGU G UCUUGGCC	1584	GGCCAGAA GGCTAGCTACAACGA ACACGGGT	4607
347	ACCNAACU G UUGUCUC	1585	GAGGACAA GGCTAGCTACAACGA AGCTTGGT	4608
350	AACCGUUU G UCCUCCAA	1586	TTGGAGGA GGCTAGCTACAACGA AACAGGTT	4609
362	UCCAAUUU G UCCUGGUU	1587	AACCAAGG GGCTAGCTACAACGA AAATTTGA	4610
381	CGUCGUAU G UGUCUGCG	1588	CGCAGACA GGCTAGCTACAACGA ATCCAGCG	4611
383	CUGGAUGU G UCUGCGGC	1589	GCCGAGAA GGCTAGCTACAACGA ACATCCAG	4612
438	AUCUUUCU G UUGUUCU	1590	AGAACCAA GGCTAGCTACAACGA AGAAGAT	4613
465	CAAGGUUU G UUGCCCGU	1591	ACGGGCAA GGCTAGCTACAACGA ATACCTTG	4614
476	GCCCGUUU G UCCUCUAA	1592	TTAGAGGA GGCTAGCTACAACGA AAACGGGC	4615
555	ACCUCUAU G UUUCCGUC	1593	GAGGGAAA GGCTAGCTACAACGA AGTGGGG	4616
566	UCCUCUAU G UUGUCUGA	1594	TACAGCAA GGCTAGCTACAACGA ATGAGGGA	4617
572	AUGUUGCU G UACAAAAC	1595	GTTTGTGA GGCTAGCTACAACGA AGCAACAT	4618
602	CGGACCCU G UAUUCCCA	1596	TGGGAATA GGCTAGCTACAACGA AGGTGCG	4619
694	UGCCAUUU G UUCAGUGG	1597	CCACTGAA GGCTAGCTACAACGA AAATGGCA	4620
724	CCCCCAU G UCUGGCUU	1598	AAGCCAAA GGCTAGCTACAACGA AGTGGGG	4621
750	UGGAUGAU G UGGUUUUG	1599	CAAAACCA GGCTAGCTACAACGA ATCATCCA	4622
771	CCAAGUCU G UACAACAU	1600	ATGTTGTA GGCTAGCTACAACGA AGACTTGG	4623
801	AUGCCGCU G UUAACCAU	1601	ATTGTTAA GGCTAGCTACAACGA AGCGGCAT	4624
818	UUUCUUUU G UCUUUGGG	1602	CCCAAAGA GGCTAGCTACAACGA AAAGAAAA	4625
888	UGGAUGAU G UAUUUGGG	1603	CCCAATTA GGCTAGCTACAACGA ATGATCCA	4626
927	AACAUUUU G UACAAAAA	1604	TTTTTGTG GGCTAGCTACAACGA ATATGTT	4627
944	AUCAAUUU G UGUUUUAG	1605	CTAAACCA GGCTAGCTACAACGA ATTTTGT	4628
946	CAAAUUGU G UUUUAGGA	1606	TCCTAAAA GGCTAGCTACAACGA ACATTTTG	4629
963	AACUUCUU G UAAACAGG	1607	CCTGTTTA GGCTAGCTACAACGA AGGAAGTT	4630
991	GAAAGUAU G UCAACGAA	1608	TTCTGTTG GGCTAGCTACAACGA ATACTTTC	4631
1002	AACGAAUU G UGGGUCUU	1609	AAGACCCA GGCTAGCTACAACGA AATTCGTT	4632
1039	CACGCAUU G UGGUAUUU	1610	AATATCCA GGCTAGCTACAACGA ATTGCGTG	4633
1137	AACAGUAU G UGAACCUU	1611	AAGGTTCA GGCTAGCTACAACGA ATACTGTT	4634
1184	UGCCAAUG G UUUUCUGA	1612	TCAGCAAA GGCTAGCTACAACGA ACTTGCCA	4635
1251	GAACCUUU G UGUUCCUU	1613	AGGAGACA GGCTAGCTACAACGA AAAGGTTT	4636
1253	ACCUUUGU G UCUUCCUU	1614	AGAGGAGA GGCTAGCTACAACGA ACAAAGGT	4637
1294	AGCCGCUU G UUUUGUCU	1615	GAGCAAAA GGCTAGCTACAACGA AAGCGGCT	4638
1344	ACAAUUUU G UCGUGUCU	1616	GAGCAGGA GGCTAGCTACAACGA AGAATTTG	4639
1390	GUUAGGCU G UGUGGCCA	1617	TGGCAGCA GGCTAGCTACAACGA AGCCTAGC	4640
1425	CGUCUUUU G UUAACGUC	1618	GACGTAAA GGCTAGCTACAACGA AAGGAGCG	4641
1508	CGCCUAUU G UACCGACC	1619	GCTCGGTA GGCTAGCTACAACGA ATAGGGCG	4642
1557	CCCCGUCU G UGCUCUUC	1620	AGAAGGCA GGCTAGCTACAACGA AGACGGGG	4643
1581	CGGACCGU G UGCAGUUC	1621	GAAGTGTA GGCTAGCTACAACGA ACGGTCCG	4644
1684	UCAGCAAU G UCAACGAC	1622	GTCGTTGA GGCTAGCTACAACGA ATTGCTGA	4645
1719	GAAGGACU G UGUUGUUA	1623	TAAACACA GGCTAGCTACAACGA AGTCTTTG	4646
1721	AAGACUGU G UGUUUAAU	1624	ATTAACAA GGCTAGCTACAACGA ACATGCTT	4647
1723	GACUGUGU G UUUAAUGA	1625	TCATTAAG GGCTAGCTACAACGA ACACAGTC	4648
1772	AGAGCUUU G UACUAGGA	1626	TCCTAGTA GGCTAGCTACAACGA AAAGACCT	4649
1785	AGGAGGCU G UAGGCAUA	1627	TATGCTTA GGCTAGCTACAACGA AGCCTCCT	4650
1801	AAAUUGGU G UGUUCAAC	1628	GGTGAACA GGCTAGCTACAACGA ACCCAATT	4651
1803	AUUGUGGU G UUCACCAG	1629	CTGTGAAA GGCTAGCTACAACGA ACACCAAT	4652
1850	CAUCUCAU G UUCAUGUC	1630	GACATGAA GGCTAGCTACAACGA ATGAGATG	4653

Table 4 i

1856	AUGUUAU G	UCCUACUG	1631	CAGTAGGA	GGCTAGCTACAACGA	ATGAACAT	4654
1864	GUCCUACU G	UUCUAGCC	1632	GGCTTGAA	GGCTAGCTACAACGA	AGTAGGAC	4655
1881	UCCAAGCU G	UGCCUUGG	1633	CCAAGGCA	GGCTAGCTACAACGA	AGCTTGGA	4656
1939	GAGCUUCU G	UGGAGUUA	1634	TAACCTCA	GGCTAGCTACAACGA	AGAAGCTC	4657
2013	UCUGUCU G	UAUCGGGG	1635	CCCCGATA	GGCTAGCTACAACGA	AGAGCAGA	4658
2045	GGACAUAU G	UUCACCUC	1636	GAGGTGAA	GGCTAGCTACAACGA	AATGTTCC	4659
2082	GCUAUUCU G	UGUUGGGG	1637	CCCCAACA	GGCTAGCTACAACGA	AGAATAGC	4660
2084	UAUUCUGU G	UUGGGGUG	1638	CACCCCAA	GGCTAGCTACAACGA	ACAGAATA	4661
2167	UCAGCUAU G	UCAACGUU	1639	AACGTTGA	GGCTAGCTACAACGA	ATAGCTGA	4662
2205	CAACUAU G	UGGUUUUA	1640	TGAAACCA	GGCTAGCTACAACGA	AATAGTTG	4663
2222	CAUUAUUCU G	UCUUAUUA	1641	AAGTAAAG	GGCTAGCTACAACGA	AGCAATAG	4664
2245	GAGAAACU G	UUUUAUAA	1642	TTCAAGAA	GGCTAGCTACAACGA	AGTTTCTC	4665
2262	UAUUUGGU G	UCUUUUUG	1643	CCAAUAGA	GGCTAGCTACAACGA	ACCAATAA	4666
2274	UUUGGAGU G	UGGAUUUG	1644	CGAATCCA	GGCTAGCTACAACGA	ACTCCAAA	4667
2344	AAACUACU G	UUGUUAAG	1645	TCTAACAA	GGCTAGCTACAACGA	AGTAGTTT	4668
2347	CUACUGU G	UUAAGACA	1646	TCGTCTAA	GGCTAGCTACAACGA	AACAGTAG	4669
2450	AUCUCAAU G	UUAUAUUU	1647	AATACTAA	GGCTAGCTACAACGA	ATTAGAGT	4670
2573	AGGACAUAU G	UUGUAAGA	1648	TCTATCAA	GGCTAGCTACAACGA	AATGTCTT	4671
2583	UGAUAGAU G	UAGAUAUU	1649	ATTGCTTA	GGCTAGCTACAACGA	ATCTATCA	4672
2594	AGCAAAUUU G	UGGGGGCC	1650	GGGCCCCA	GGCTAGCTACAACGA	AAATTGCT	4673
2663	AUCCCAAU G	UUAUAUAA	1651	TTTAGTAA	GGCTAGCTACAACGA	ATTGGGAT	4674
2717	CAGAGUAU G	UAGUUAUU	1652	ATTAACTA	GGCTAGCTACAACGA	ATACTCTG	4675
2901	AUCUUUCU G	UCCCAUAU	1653	ATTGGGGA	GGCTAGCTACAACGA	AGAAAGAT	4676
3071	GGGGGACU G	UUGGGGUG	1654	CACCCCAA	GGCTAGCTACAACGA	AGTCCCCC	4677
3111	UCACAACU G	UGCCCAAG	1655	TGCTGGCA	GGCTAGCTACAACGA	AGTTGTGA	4678
40	AUCCCAAG G	UCAGGGCC	1656	GGCCCTGA	GGCTAGCTACAACGA	TCTGGGAT	4679
46	GAGUACAG G	CCCUUUAU	1657	GTACAGGG	GGCTAGCTACAACGA	CCTGACTC	4680
65	UCUUGUG G	UGGCUCCA	1658	TGGAGCCA	GGCTAGCTACAACGA	CAGCAGGA	4681
68	UGUCUGUG G	CUCCAGUU	1659	AACGTGAG	GGCTAGCTACAACGA	CACCAGCA	4682
74	UGGCUCCA G	UUCAGGAA	1660	TTCTTGAA	GGCTAGCTACAACGA	TGGAGCCA	4683
85	CAGGAACA G	UGAGCCCU	1661	AGGGCTCA	GGCTAGCTACAACGA	TGTTCTTG	4684
89	AACAGUGA G	CCCUUGUC	1662	GAGCAGGG	GGCTAGCTACAACGA	TCACTGTT	4685
120	GCUAUAUC G	UCAAUAUU	1663	AAGATTGA	GGCTAGCTACAACGA	GATATGGC	4686
196	CCCUUGUC G	UGGUUACAG	1664	CTGTAAAC	GGCTAGCTACAACGA	GAGCAGGG	4687
205	UGUUAACAG G	CGGGGUUU	1665	AAACCCCG	GGCTAGCTACAACGA	CTGTAAAC	4688
210	CAGGCGGG G	UUUUUUUU	1666	AAGAAAAA	GGCTAGCTACAACGA	CCCGCTTG	4689
248	ACCACAGA G	UCUAGACU	1667	AGTCTAGA	GGCTAGCTACAACGA	TCTGTGGT	4690
258	CUAGACUC G	UGGUUGAC	1668	GTCCACCA	GGCTAGCTACAACGA	GAGTCTAG	4691
261	GACUCUGU G	UGGACUUC	1669	GAAGTCCA	GGCTAGCTACAACGA	CAGCAGTC	4692
295	GAAACACC G	UGUGUCUU	1670	AAGAACA	GGCTAGCTACAACGA	GGGTGTTT	4693
305	GUGUCUGU G	CCAAAUAU	1671	AAATTTTG	GGCTAGCTACAACGA	CAAGACAC	4694
318	AAUUCUGA G	UCCCAUAU	1672	ATTGTTGA	GGCTAGCTACAACGA	TCCGAATT	4695
332	AAUUCUCA G	UCACUACU	1673	GTGATGTA	GGCTAGCTACAACGA	TGGAGATT	4696
368	UUUUCUGU G	UUUUGUCU	1674	AGCGATGA	GGCTAGCTACAACGA	GAGCAGAA	4697
390	UGUCUGCG G	CGUUUUUA	1675	ATAAAACG	GGCTAGCTACAACGA	CCGAGACA	4698
392	UCUGCGCG G	UUUUUAUA	1676	TGATAAAA	GGCTAGCTACAACGA	GCCGAGAA	4699
442	UCUUGUGU G	UUUUUUUG	1677	CAGAAAGG	GGCTAGCTACAACGA	CAACAAGA	4700
461	CUAUCAAG G	UAUUGUUC	1678	GCAACATA	GGCTAGCTACAACGA	CTTGATAG	4701
472	UGUUGCCC G	UUUGUCUU	1679	AGACACAA	GGCTAGCTACAACGA	GGCACAAC	4702
506	AACAACCA G	CACCGGAC	1680	GTCCGGTG	GGCTAGCTACAACGA	TGGTGTGT	4703
625	CAUCUUGG G	CUUUCGCA	1681	TGCGAAGG	GGCTAGCTACAACGA	CCAAGATG	4704

Table 41

648	CUAUGGGA	G	UGGGCCUC	1682	GAGGCCCA	GGCTAGCTACAACGA	TCCCATAG	4705
652	GGGAGUGG	G	CCUCAGUC	1683	GACTGAGG	GGCTAGCTACAACGA	CCACTCCC	4706
658	GGGGCCUA	G	UCCGUUUC	1684	GAAACGGA	GGCTAGCTACAACGA	TGAGGCC	4707
662	CUCAGUCC	G	UUUCUCUU	1685	AAGAGAAA	GGCTAGCTACAACGA	GGACTGAG	4708
672	UUUCUUGG	G	CUCAGUUU	1686	AAACTGAG	GGCTAGCTACAACGA	CAAGGAAA	4709
677	UUUGGCUA	G	UUUACUAG	1687	CTAGTAAA	GGCTAGCTACAACGA	TGAGCCAA	4710
685	GUUUUUAU	G	UGCCAUUG	1688	AAATGGCA	GGCTAGCTACAACGA	TAGTAAAC	4711
699	UUUUUUUA	G	UGGUUCGU	1689	ACGAACCA	GGCTAGCTACAACGA	TGAACAAA	4712
702	GUUCAGUG	G	UUUCUAGG	1690	CCTACGAA	GGCTAGCTACAACGA	CACTGAAC	4713
706	AGUGGUUC	G	UAGGGCUU	1691	AAGCCCTA	GGCTAGCTACAACGA	GAACCACT	4714
711	UUUCUAGG	G	UUUCCCC	1692	GGGGAAGG	GGCTAGCTACAACGA	CCTACGAA	4715
729	ACUUGUCG	G	UUUUCAGU	1693	ACTGAAAG	GGCTAGCTACAACGA	CAGACAGT	4716
736	GGUUUUUA	G	UUUUAUUG	1694	CCATATAA	GGCTAGCTACAACGA	TGAAGGCC	4717
753	AUGAUUGG	G	UUUUGGGG	1695	CCCCAAAA	GGCTAGCTACAACGA	CACATCAT	4718
762	UUUUGGGG	G	CCAAGUCU	1696	AGACTTGG	GGCTAGCTACAACGA	CCCCAAAA	4719
767	GGGGCCAA	G	UCUGUACA	1697	TGTACAGA	GGCTAGCTACAACGA	TTGGCCCC	4720
785	CAUCUUGA	G	UCCCUUUA	1698	TAAAGGGA	GGCTAGCTACAACGA	TCAAGATG	4721
826	GUUUUUUG	G	UAUUAUUA	1699	AATGTATA	GGCTAGCTACAACGA	CCAAAGAC	4722
898	AAUUGGGA	G	UUUGGGCA	1700	TGCCCTAA	GGCTAGCTACAACGA	TCCCAATT	4723
904	GAGUUGGG	G	CACAUUGC	1701	GCAATGTG	GGCTAGCTACAACGA	CCCAACTC	4724
971	GUAAACAG	G	CCUUAUGA	1702	TCAATAGG	GGCTAGCTACAACGA	CTGTTTAC	4725
987	AUUGGAAA	G	UAUUGCAA	1703	TTGACATA	GGCTAGCTACAACGA	TTTCCAAAT	4726
1006	AAUUGUUG	G	UCUUUUUG	1704	CCAAAGAA	GGCTAGCTACAACGA	CCACAAAT	4727
1016	CUUUUUGG	G	UUUGCGCG	1705	CGGGCAAA	GGCTAGCTACAACGA	CCCCAAG	4728
1080	GCAUACAA	G	CAAAACAG	1706	CTGTTTGG	GGCTAGCTACAACGA	TTGTATGC	4729
1089	CAAAACAG	G	CUUUUACU	1707	AGTAAAGG	GGCTAGCTACAACGA	CTGTTTGG	4730
1116	CUUACAAG	G	CCUUUUAU	1708	TAGAAAGG	GGCTAGCTACAACGA	CTTGTAG	4731
1126	CUUUUUAU	G	UAAACAGU	1709	ACTGTTTA	GGCTAGCTACAACGA	TTAGAAAG	4732
1133	AGUAAACA	G	UAUGUGAA	1710	TTACACATA	GGCTAGCTACAACGA	TGTTTACT	4733
1152	UUUACCCC	G	UUUGUCGG	1711	CCGAGCAA	GGCTAGCTACAACGA	GGGTATAA	4734
1160	GUUGUCUG	G	CAACGGCC	1712	GGCCCTTG	GGCTAGCTACAACGA	CGAGCAAC	4735
1166	CGGCAACG	G	CCUGGUUC	1713	AGACCAAG	GGCTAGCTACAACGA	CGTTGCCG	4736
1171	ACGGCCUG	G	UCUUAUCC	1714	GGCATAGA	GGCTAGCTACAACGA	CAGGCCGT	4737
1182	UAUGCCAA	G	UGUUUGCU	1715	AGCAAACA	GGCTAGCTACAACGA	TTGGCATA	4738
1207	CCCCACUG	G	UUUGGGCU	1716	AGCCCAAA	GGCTAGCTACAACGA	CAGTGGGG	4739
1213	UGGUUGGG	G	CUUGGCCA	1717	TGGCCAAAG	GGCTAGCTACAACGA	CCCAACCA	4740
1218	GGGGCUUG	G	CCAUAGGC	1718	GCCTATGG	GGCTAGCTACAACGA	CAGGCCCC	4741
1225	GGCCAUAG	G	CCAUCACG	1719	GCTATGGG	GGCTAGCTACAACGA	CTATGGCC	4742
1232	GGCCAUCA	G	CGCAUGCG	1720	GCATCGCG	GGCTAGCTACAACGA	TGATGGCC	4743
1240	GGCCAUUG	G	UGGAACCU	1721	AGGTTCCT	GGCTAGCTACAACGA	GCATGGCG	4744
1287	AACUCCUA	G	CCGCUUUG	1722	ACAAGCGG	GGCTAGCTACAACGA	TAGGAGTT	4745
1306	UGUCUGCA	G	CAGUCUGG	1723	CAGACCTG	GGCTAGCTACAACGA	CTAGGACA	4746
1310	CGCAGCAG	G	UCUGGGCG	1724	GCCCAAGA	GGCTAGCTACAACGA	CTGCTGGC	4747
1317	GGUUGGGG	G	CAAAACUC	1725	GAGTTTTG	GGCTAGCTACAACGA	CCGAGACC	4748
1347	AUUCUGUC	G	UGUCUUC	1726	GGAGAGCA	GGCTAGCTACAACGA	GACAGAAT	4749
1379	UUUCCUAG	G	CUGCUAGG	1727	CCTAGCAG	GGCTAGCTACAACGA	CATGGAAG	4750
1387	GCUCUGAG	G	CUGUCUGG	1728	CAGCAGCA	GGCTAGCTACAACGA	CTAGCAGC	4751
1418	CGCGGAGC	G	UCCUUUUG	1729	ACAAAGGA	GGCTAGCTACAACGA	GTCCCGCG	4752
1431	UUUUUUUA	G	UCGGUCG	1730	CGACCGGA	GGCTAGCTACAACGA	GTAAACAA	4753
1436	UACGUCCC	G	UCGGCGCU	1731	AGCGCCGA	GGCTAGCTACAACGA	GGGACGTA	4754
1440	UCCCGUCG	G	CGUCGAUU	1732	ATTCAAGC	GGCTAGCTACAACGA	CGACGGGA	4755

Table 41

1471	CUCCCCGG	G CCGCUUGG	1733	CCAAGCGG	GGCTAGCTACAACGA	CCCCGGAG	4756
1481	CGCUUGGG	G CUCUACCG	1734	CGGTAGAG	GGCTAGCTACAACGA	CCCCAAGCG	4757
1517	UACCGACC	G UCCACGGG	1735	CCCGTGGG	GGCTAGCTACAACGA	GGTCGGTA	4758
1526	UCCACGGG	G CGCACCU	1736	GAGGTGCG	GGCTAGCTACAACGA	CCCGTGGG	4759
1553	GACUCCCC	G UCUGUGCC	1737	GGCACA	GGCTAGCTACAACGA	GGGGATG	4760
1579	CGCGGACC	G UGUGCACU	1738	AGTGACA	GGCTAGCTACAACGA	GGTCGGC	4761
1605	CUCUGCAC	G UCGACUGG	1739	CCATGCGA	GGCTAGCTACAACGA	GTGACAG	4762
1622	AGACACC	G UGAACCGG	1740	GGCGTCA	GGCTAGCTACAACGA	GGTGGTCT	4763
1649	UGGCCAAG	G UCUGUCAU	1741	ATGCAAGA	GGCTAGCTACAACGA	CTTGCGCA	4764
1679	GACUUAUC	G CAUUGUCA	1742	TGACATTG	GGCTAGCTACAACGA	TGAAGTC	4765
1703	ACCUUGAG	G CAUACUUC	1743	GAAGTATG	GGCTAGCTACAACGA	CTCAAGGT	4766
1732	UUUAADGA	G UGGGAGGA	1744	TCTCCCA	GGCTAGCTACAACGA	CTCATTA	4767
1741	UGGGAGGA	G UUGGGGGA	1745	TCCCCAA	GGCTAGCTACAACGA	TCTCCCA	4768
1754	GUGGAGAG	G UUGGUGUA	1746	TAACCTAA	GGCTAGCTACAACGA	CTCTCCC	4769
1759	GAGGUUAG	G UUAAGGU	1747	ACCTTTAA	GGCTAGCTACAACGA	CTAACCTC	4770
1766	GGUUAAG	G UCUUGUA	1748	TACAAGA	GGCTAGCTACAACGA	CTTTAACC	4771
1782	ACUAGGAG	G CUGUAGGC	1749	GGCTACAG	GGCTAGCTACAACGA	CTCTAGT	4772
1789	GGCUGUAG	G CAUAAUUC	1750	AATTTATG	GGCTAGCTACAACGA	CTACAGCC	4773
1799	AUAAAUUG	G UGUGGUCA	1751	TGAACACA	GGCTAGCTACAACGA	CAATTTAT	4774
1811	GUUCACCA	G CACCAUGC	1752	GCATGGTG	GGCTAGCTACAACGA	TGGTGAAC	4775
1870	CUGUUCAA	G CCUCCAGG	1753	CTTGGAGG	GGCTAGCTACAACGA	TTGAACAG	4776
1878	CGGUCCAA	G CUGUGCCU	1754	AGGCACAG	GGCTAGCTACAACGA	TTGGAGGC	4777
1890	UGCCUUGG	G UGGCUUUG	1755	CAAAGCCA	GGCTAGCTACAACGA	CCAAAGCA	4778
1893	CUGUGGUG	G CUUUGGGG	1756	CCCAAAG	GGCTAGCTACAACGA	CACCCAAG	4779
1901	GCUUUGGG	G CAUGGACA	1757	TGTCATAT	GGCTAGCTACAACGA	CCCAAAGC	4780
1917	AUUGACCC	G UUAUAAAG	1758	TCTTTATA	GGCTAGCTACAACGA	GGGTCAAT	4781
1933	AUUIUGGA	G CUUCUGUG	1759	CACAGAAG	GGCTAGCTACAACGA	TCCAATTT	4782
1944	UCUUGUGA	G UUAUCUCU	1760	GAGAGTAA	GGCTAGCTACAACGA	TCCACAGA	4783
2023	AUCGGGGG	G CCUUGAGG	1761	CTCTAAGG	GGCTAGCTACAACGA	CCCCGAT	4784
2031	GCUUUAGA	G UCUCGGGA	1762	TCCGGAGA	GGCTAGCTACAACGA	TCTAAGCG	4785
2062	ACCAUACG	G CACUCAGG	1763	CCTGAGTG	GGCTAGCTACAACGA	CGTATGGT	4786
2070	GCACUCAG	G CAAGCUAU	1764	ATAGCTTG	GGCTAGCTACAACGA	CTGAGTGC	4787
2074	UCAGGCAA	G CUUUCUG	1765	CAGAATAG	GGCTAGCTACAACGA	TTGCCTGA	4788
2090	GGUUGGGG	G UGAGUUGA	1766	TCAACTCA	GGCTAGCTACAACGA	CCCAACAC	4789
2094	UGGGUGGA	G UUGAUAAA	1767	TTCAATCA	GGCTAGCTACAACGA	TCAACCCA	4790
2107	UGAAUUA	G CCACCUUG	1768	CCAGGTGG	GGCTAGCTACAACGA	TAGATTCA	4791
2116	CCACCUUG	G UGGGAGU	1769	ACTTCCCA	GGCTAGCTACAACGA	CCAGGTGG	4792
2123	GGUGGGAA	G UUAUUGUG	1770	CCAAATTA	GGCTAGCTACAACGA	TTCCACCC	4793
2140	AGAUAUCC	G CAUACAAG	1771	CTGGAATG	GGCTAGCTACAACGA	TGATCTTT	4794
2155	GGGAUUA	G UAGUCAGC	1772	GCTGACTA	GGCTAGCTACAACGA	TAAITCCC	4795
2158	AUUUAUGA	G UCAGCUAU	1773	ATAGCTGA	GGCTAGCTACAACGA	TACTAATT	4796
2162	AGUAUGUA	G CUUUGUCA	1774	TGACATAG	GGCTAGCTACAACGA	TGACTACT	4797
2173	AUUGUACG	G UUAUUAUG	1775	CATATTAA	GGCTAGCTACAACGA	GTTCACAT	4798
2183	UAUUAUUG	G CCAUAAUA	1776	TTTTTATG	GGCTAGCTACAACGA	CCATATTA	4799
2208	CUUUAUGG	G UUUUACA	1777	ATGTGAAA	GGCTAGCTACAACGA	CACATATG	4800
2235	ACUUUUGG	G CGAGAAAC	1778	GTCTTCGG	GGCTAGCTACAACGA	CCAAAAGT	4801
2260	AAUAUUGG	G UGUUUUUU	1779	AAAAGACA	GGCTAGCTACAACGA	CAAAATTT	4802
2272	CUUUUUGA	G UGUUGAUU	1780	AATCCACA	GGCTAGCTACAACGA	TCCAAAAG	4803
2360	ACGAGAAG	G CAGGUCCT	1781	GGGACCTG	GGCTAGCTACAACGA	CTCTTCGT	4804
2364	AGAGGCAG	G UCCCUUAG	1782	CTAGGGGA	GGCTAGCTACAACGA	CTGCCTCT	4805
2403	AGACGAAG	G UCUCUAUC	1783	GATTGAGA	GGCTAGCTACAACGA	CTTCGTCT	4806

Table 41

2417	AUCGCCGC	G	UCGCAGAA	1784	TTCTGCGA	GGCTAGCTACAACGA	GCGGCGAT	4807
2454	CAAUGUUA	G	UAUUCCTU	1785	AAGGAATA	GGCTAGCTACAACGA	TAACATTG	4808
2474	CACAUAAG	G	UGGGAAAC	1786	GTTCCTCA	GGCTAGCTACAACGA	CTTATGTG	4809
2491	UUUACGGG	G	CUUUAUUC	1787	GAATAAAG	GGCTAGCTACAACGA	CCCGTAAA	4810
2507	CUUCUACG	G	UACCUUGC	1788	GCAAGGTA	GGCTAGCTACAACGA	CGTAGAAG	4811
2530	CCUAAUUG	G	CAAAUUC	1789	GGAGTTTG	GGCTAGCTACAACGA	CATTTAGG	4812
2587	AGAUGUAA	G	CAAUUUGU	1790	ACAAATTG	GGCTAGCTACAACGA	TTACATCT	4813
2599	UUUUGGGG	G	CCCCUAC	1791	GTAAAGGG	GGCTAGCTACAACGA	CCCAACAA	4814
2609	CCCUUACA	G	UAAAUAGAA	1792	TTCTATTTA	GGCTAGCTACAACGA	TGTAAAGG	4815
2650	CCUCUACG	G	UUUUAUCC	1793	GGATAAAA	GGCTAGCTACAACGA	CTAGCAGG	4816
2701	AUCAAACC	G	UAUUAUCC	1794	GGATAATA	GGCTAGCTACAACGA	GGTTTGAT	4817
2713	UAUCUAGA	G	UAUGUAGU	1795	ACTACATA	GGCTAGCTACAACGA	TCTGGATA	4818
2720	AGUAUGUA	G	UUAAUACU	1796	ATGATTAA	GGCTAGCTACAACGA	TACATACT	4819
2768	UUUGGAAG	G	CGGGGAUC	1797	GATCCCGG	GGCTAGCTACAACGA	CTTCCAAA	4820
2791	AAAAGAGA	G	UCCACAAG	1798	CGTGTGGA	GGCTAGCTACAACGA	TCTCTTTT	4821
2799	GUCCACAC	G	UAGCGCTU	1799	AGCGGCTA	GGCTAGCTACAACGA	GTTTGGAC	4822
2802	CACACGUA	G	CGCCUACU	1800	ATGAGCGT	GGCTAGCTACAACGA	TACGTGTG	4823
2818	UUUUGCGG	G	UCACCAUA	1801	TATGTTGA	GGCTAGCTACAACGA	CCGCAAAA	4824
2848	GAUCUACA	G	CAUGGGAG	1802	CTCCCATG	GGCTAGCTACAACGA	TGTAGATC	4825
2857	CAUGGGAG	G	UUGGUUUC	1803	AAGACCAA	GGCTAGCTACAACGA	CTCCCATG	4826
2861	GGAGGUUG	G	UCUUCCAA	1804	TGGGAAGA	GGCTAGCTACAACGA	CAACTTCC	4827
2881	UGCAAAAG	G	CAUGGGGA	1805	TCCCATGG	GGCTAGCTACAACGA	GTTTTCGA	4828
2936	GAUCAUCA	G	UUGGACCC	1806	GGGTCCAA	GGCTAGCTACAACGA	TGATGATC	4829
2955	CAUCUCAA	G	CCAACUAC	1807	TGAGTTGG	GGCTAGCTACAACGA	TTTGAATG	4830
2964	CCAACUCA	G	UAAAUCCA	1808	TGGATTTA	GGCTAGCTACAACGA	TGAGTTGG	4831
3005	GACAACUG	G	CCGGAACG	1809	GGTCTCCG	GGCTAGCTACAACGA	CAGTTGTC	4832
3021	CCAACAAG	G	UGGGAGUG	1810	CACCTCCA	GGCTAGCTACAACGA	CTTGTTGG	4833
3027	AGGUUGGA	G	UGGGAGCA	1811	TGCTCCCA	GGCTAGCTACAACGA	TCCACCTC	4834
3033	GAGUUGGA	G	CAUUCGGG	1812	CCCGAATG	GGCTAGCTACAACGA	TTCACCTC	4835
3041	GCAUUCGG	G	CCAGGGUU	1813	AACCTTGG	GGCTAGCTACAACGA	CCGAATGC	4836
3047	GGGCCAGG	G	UUCACCCC	1814	GGGGTGAA	GGCTAGCTACAACGA	CCTGGCCC	4837
3077	CGUUGGGG	G	UGGAGCCC	1815	GGGCTCCA	GGCTAGCTACAACGA	CCCAACAG	4838
3082	GGGGUGGA	G	CCCUACAG	1816	CGTAGAGG	GGCTAGCTACAACGA	TCCACCCC	4839
3097	GCUCUAGG	G	CCUACUCA	1817	TGAGTAGG	GGCTAGCTACAACGA	CCTGAGCG	4840
3117	CUUGGCCA	G	CAGCUCUU	1818	AGGAGCTG	GGCTAGCTACAACGA	TGCAACAG	4841
3120	UGCCAGCA	G	CUCCUCCU	1819	AGGAGGAG	GGCTAGCTACAACGA	TGCTGGCA	4842
3146	ACCAAUUCG	G	CAGUCAGG	1820	CCTGACTG	GGCTAGCTACAACGA	CGATTGGT	4843
3149	AAUUGGCA	G	UCAAGGAG	1821	CTTCCTGA	GGCTAGCTACAACGA	TGCGGATT	4844
3158	UCAGGAAG	G	CAGCUCUAC	1822	GTAGGGCT	GGCTAGCTACAACGA	CTTCTGCA	4845
3161	GGAAAGCA	G	CCUACUCC	1823	GGAGTAGG	GGCTAGCTACAACGA	TGCTTCC	4846
3204	AUCCUCAG	G	CCAUGCAG	1824	CTGCTAGG	GGCTAGCTACAACGA	CTGAGGAT	4847
10	ACUCCACC	A	CUUUCACC	1825	GTGGAAAG	GGCTAGCTACAACGA	GTTGGAGT	4848
17	CACUUUCC	A	CCAAUUC	1826	GAGTTTGG	GGCTAGCTACAACGA	GGAAAGTG	4849
22	UCAGACAA	A	CUUUCUAA	1827	TTGAAGAG	GGCTAGCTACAACGA	TGTGTGGA	4850
32	UCUUCAAAG	A	UCCACAGG	1828	CTCTGGGA	GGCTAGCTACAACGA	CTTGAAGA	4851
53	GGCCUUGU	A	CUUUCUUG	1829	CAGGAAGG	GGCTAGCTACAACGA	ACAGGGCC	4852
82	GUUCUAGA	A	CAGUGAGC	1830	GCTCACTG	GGCTAGCTACAACGA	TCTGGAAC	4853
101	UGUCUAGA	A	UUGUCUCU	1831	AGACAGTA	GGCTAGCTACAACGA	TCTGAGCA	4854
103	CUAGAAU	A	CUGUCUCU	1832	AGAGAGAG	GGCTAGCTACAACGA	ATTCTGAG	4855
115	UCUCUGCC	A	UAUCUGCA	1833	TGACGATA	GGCTAGCTACAACGA	GCAGAGAG	4856
117	UCUGCCAU	A	UCGUCAAU	1834	ATTGACGA	GGCTAGCTACAACGA	ATGGCAGA	4857

Table 4 i

124	UAUUGCUA A UCUUAUCG	1835	CGATAAGA GGCTAGCTACAACGA TGACGATA	4858
129	UCAUUCUU A UCGAAGAC	1836	GTCTTCGA GGCTAGCTACAACGA AAGATTGA	4859
136	UAUGCUAG A CUGGGGAC	1837	GTCGCCAG GGCTAGCTACAACGA CTTCGATA	4860
143	GACUGGGG A CCGUGUAC	1838	GTACAGGG GGCTAGCTACAACGA CCCCAGTC	4861
150	GACCCUUG A CCGAACAU	1839	ATGTTCGG GGCTAGCTACAACGA ACAGGGTC	4862
155	UGUACCGA A CAUGGAGA	1840	TCTCCATG GGCTAGCTACAACGA TCCTGATA	4863
157	UACCGAAC A UGGAGAAC	1841	GTTCTCCA GGCTAGCTACAACGA GTTCGGTA	4864
164	CAUGGAGA A CAUGGCAU	1842	ATGCGATG GGCTAGCTACAACGA TCTCCATG	4865
166	UGUGAAGC A CCGUGUAC	1843	TGATGCGA GGCTAGCTACAACGA GTTCTCCA	4866
171	AACAUCCG A UCAGGACU	1844	AGTCTCTG GGCTAGCTACAACGA GCGATGTT	4867
177	GCAUCAGG A CUCUAGG	1845	CCTAGGAG GGCTAGCTACAACGA CCGATGTC	4868
186	CUCUAGG A CCCCUGCU	1846	AGCAGGGG GGCTAGCTACAACGA CCTAGGAG	4869
201	CUCUGUUG A CAGGCGGG	1847	CCCGCCTG GGCTAGCTACAACGA AACACGAG	4870
223	UCUUGUUG A CAAAAAUC	1848	GATTTTGT GGCTAGCTACAACGA GTTCTCCA	4871
229	UGACAAAA A UCCUCAAC	1849	TGTGAGGA GGCTAGCTACAACGA TTTTGTCA	4872
235	AAAUCUUC A CAAUACCA	1850	TGCTATTG GGCTAGCTACAACGA GAGGATTT	4873
238	UCCUCACA A UACACAGC	1851	CTGTGGTA GGCTAGCTACAACGA TGTGAGGA	4874
240	CUCACAAU A CCACAGAG	1852	CTCTGTGG GGCTAGCTACAACGA ATGTGTAG	4875
243	ACAAUACC A CAGAGUCU	1853	AGACTCTG GGCTAGCTACAACGA GGTATTGT	4876
254	GAGUCUAG A CUCUGUGU	1854	ACCACGAG GGCTAGCTACAACGA CTAGACTC	4877
265	CGUGUGUG A CUUCUUC	1855	GAGAGAGG GGCTAGCTACAACGA CCACACG	4878
275	UUCUCUCA A UUUUCUAG	1856	CTAGAAAA GGCTAGCTACAACGA TGAGAGAA	4879
289	UAGGGGGA A CACCCGUG	1857	CACGGGTG GGCTAGCTACAACGA TCCCCCTA	4880
291	GGGGGAGC A CCGUGUGG	1858	CACACGGG GGCTAGCTACAACGA GTTCCCCC	4881
311	UGGCCAAA A UUCGCAAG	1859	ACTGCCAA GGCTAGCTACAACGA TTGGCCCA	4882
325	AGUCCCAA A UCUCGAGU	1860	ACTGGAGA GGCTAGCTACAACGA TTGGGACT	4883
335	CUCGAGUC A CUCACCAA	1861	TTGGTGAG GGCTAGCTACAACGA GACTGGAG	4884
339	AGUCACUC A CCAACCCG	1862	CAGGTGGG GGCTAGCTACAACGA GAGTGACT	4885
343	ACUCACCA A CCGUGUGU	1863	ACAAACGG GGCTAGCTACAACGA TGCTGAGT	4886
358	GUCCUCCA A UUUUGUCU	1864	AGGACAAA GGCTAGCTACAACGA TGAGGAGC	4887
371	UCCUGGUU A UCGCUGGA	1865	TCCAGCGA GGCTAGCTACAACGA AACACGGA	4888
379	AUCGCGUG A UGUUGUCG	1866	CAGACACA GGCTAGCTACAACGA CCACGAT	4889
397	GGCGUUUU A UCAUCUUC	1867	GAAGATGA GGCTAGCTACAACGA AAAACGCC	4890
400	GUUUUUUC A UCUUCCUC	1868	GAGGAAGA GGCTAGCTACAACGA GATAAAAC	4891
412	UCCUUGUC A UCCUGUCU	1869	CAGCAGGA GGCTAGCTACAACGA GCAGAGGA	4892
423	CUGUGUCU A UGCUCUAC	1870	ATGAGGCA GGCTAGCTACAACGA AGCAGCAG	4893
430	UAUGCCUC A UCUUUGUG	1871	CAAGAAGA GGCTAGCTACAACGA GAGGCATA	4894
452	UCUUCUGG A CUUUCAGC	1872	CTTGATAG GGCTAGCTACAACGA CCAAGAGA	4895
455	UCUGGACU A UCAAGGUA	1873	TACCTTGA GGCTAGCTACAACGA AGTCACGA	4896
463	AUCUAGGU A UGUUGCCC	1874	GGGCAACA GGCTAGCTACAACGA AACTTGAT	4897
484	GUCCUCUA A UUCGAGGA	1875	TCCTGGAA GGCTAGCTACAACGA TAGAGGAC	4898
492	AUUGCCAG A UCAUAAAC	1876	GTGATGTA GGCTAGCTACAACGA GCTGGGAT	4899
495	CAAGGAUC A UCAACAAAC	1877	GTGTTGTA GGCTAGCTACAACGA GATCCTGG	4900
499	GAUCCUAC A CAACACAGC	1878	GCTGTTTG GGCTAGCTACAACGA GATGATTC	4901
502	CAUCACAA A CCAAGCAC	1879	GGTGCTGG GGCTAGCTACAACGA TTTGATGT	4902
513	AGCACCCG A CCAUGCAA	1880	TTGCTATG GGCTAGCTACAACGA CCGTGCTT	4903
516	ACCGAGCC A UGCAAAAC	1881	GTTTTGCA GGCTAGCTACAACGA GGTCCGGT	4904
523	CAUGCAAA A CCGUACAA	1882	TGTGACGG GGCTAGCTACAACGA TTTGATGT	4905
529	AAACCCUG A CAACUCUC	1883	AGGAGTTG GGCTAGCTACAACGA GCAGGTTT	4906
532	CCUGCACA A CUCCUGCU	1884	AGCAGGAG GGCTAGCTACAACGA TGTGCAAG	4907
547	CUCAAGGA A CUCUUAUG	1885	CATAGAGG GGCTAGCTACAACGA TCCTTGAG	4908

Table 4 i

553	GAACCCUC A UGUUCCCC	1886	GGGAAACA GGCTAGCTACAACGA AGAGTTTC	4909
554	UUUCCUC A UGUUGCUG	1887	CAGCAACA GGCTAGCTACAACGA GAGGGAAA	4910
574	GUUGCUGU A CAAACCCU	1888	AGGTTTTC GGCTAGCTACAACGA ACAGCAAC	4911
579	UGUACAAA A CCUACGGA	1889	TCCGTAGG GGCTAGCTACAACGA TTTGTACA	4912
583	CAAAACCU A CGGACGGA	1890	TCCGTCCG GGCTAGCTACAACGA AGGTTTTC	4913
587	ACCUCAGG A CGGAAACU	1891	AGTTTCCG GGCTAGCTACAACGA CCGTAGGT	4914
593	GGACGGAA A CGGACCCU	1892	AGGTGCGA GGCTAGCTACAACGA TTCGTCC	4915
598	GAACACUG A CCUGUAUU	1893	AATACAGG GGCTAGCTACAACGA GCAGTTTC	4916
604	GCACCGUU A UUCCCAUC	1894	GATGGGAA GGCTAGCTACAACGA ACAGGTGC	4917
610	GUUUUCCC A UCCCAUCA	1895	TGATGGGA GGCTAGCTACAACGA GGAATAC	4918
615	CCCAUCCC A UCAUCUUG	1896	CAAGATGA GGCTAGCTACAACGA GGGATGG	4919
618	AUCCCAUC A UCUUGGGC	1897	GCCCAAGA GGCTAGCTACAACGA GATGGGAT	4920
636	UUCCGAAA A UACCUAUG	1898	CATAGGTA GGCTAGCTACAACGA TTTGCGAA	4921
638	CGCAAAAU A CCUAUGGG	1899	CCCATAGG GGCTAGCTACAACGA ACTTTGCG	4922
642	AAUAACCU A UGGGAGUG	1900	CACCTCCA GGCTAGCTACAACGA AGGTATTT	4923
681	CUCAGUUU A CUAGUGCC	1901	GGCACTAG GGCTAGCTACAACGA AAACGTAG	4924
690	CUAGUGCC A UUGGUUCA	1902	TGAACAAA GGCTAGCTACAACGA GGCATCAG	4925
721	UUUCCCCC A CUGUCUGG	1903	CCAGACAG GGCTAGCTACAACGA GGGGAAAA	4926
739	UUUUCAGU A UAUUGAUG	1904	CATCCATA GGCTAGCTACAACGA AACTGAAA	4927
741	UCAUUUAU A UGGAUAUG	1905	ATCATCCA GGCTAGCTACAACGA ATAACTGA	4928
745	UUUAUUGG A UGAUGUGG	1906	CCACATCA GGCTAGCTACAACGA CCAATATA	4929
748	UAUGAUG A UGUGGUUU	1907	AAACCAAA GGCTAGCTACAACGA CATCCATA	4930
773	AAGUCUGU A CAACAUUC	1908	AGATGTGT GGCTAGCTACAACGA ACAGACTT	4931
776	UCUGUAUA A CAUCUUGA	1909	TCAAGATG GGCTAGCTACAACGA TGACAGAA	4932
778	UGUACAAC A UCUUGAGU	1910	ACTCAAGA GGCTAGCTACAACGA GTTTGTACA	4933
793	GUCCCCUU A UGCCCGUG	1911	CAGCGGCA GGCTAGCTACAACGA AAGGGAC	4934
804	CCGCUUUU A CCAUUUUU	1912	AAAATTGG GGCTAGCTACAACGA AACGCGG	4935
808	UGUUUACA A UUUUUUUU	1913	AAAGAAAA GGCTAGCTACAACGA TGTAACAA	4936
828	CUUUGGUG A UACAUUUA	1914	TAAATGTA GGCTAGCTACAACGA ACCCAAAG	4937
830	UUGGUUAU A CAUUUAAA	1915	TTTAAATG GGCTAGCTACAACGA ATACCCAA	4938
832	GGGUUAUC A UUUAAACC	1916	GGTTTAAA GGCTAGCTACAACGA GTATACCC	4939
838	ACAUUUAA A CCCCACAA	1917	TGTGAGGG GGCTAGCTACAACGA TTAATAGT	4940
844	AAACCCUC A CAAACCAA	1918	TTGTTTTC GGCTAGCTACAACGA GAGGGTTT	4941
849	CUCACAAA A CAAAAGAA	1919	TCTTTTTC GGCTAGCTACAACGA TTTGTGAG	4942
857	ACAAAAG A UGGGGAUA	1920	TATCCCCA GGCTAGCTACAACGA CTTTTCGT	4943
863	AGAUGGGG A UAUUCCCU	1921	AGGGAAAT GGCTAGCTACAACGA CCCCATCT	4944
865	AUGGGGAA A UUCCCUUA	1922	TAAAGGAA GGCTAGCTACAACGA ATCCCATC	4945
874	UUCUCCUA A CUUCADGG	1923	CCATGAAG GGCTAGCTACAACGA TAAAGGAA	4946
879	UUATACUC A UGGGAUAU	1924	ATATCCCA GGCTAGCTACAACGA GAAGTTAA	4947
884	UUUAUGGG A UAUUAUAU	1925	ATTACATA GGCTAGCTACAACGA CCCATGAA	4948
886	CAUGGGAA A UGUUAUUG	1926	CAATTACA GGCTAGCTACAACGA ATCCCATG	4949
891	GAUAUGUA A UUGGGAGU	1927	ACTCCCAA GGCTAGCTACAACGA TACATATC	4950
906	GUUGGGGC A CAUUGCCA	1928	TGGCAATG GGCTAGCTACAACGA GCCCCAAC	4951
908	UUGGGCAC A UUGCCACA	1929	TGTGGCAA GGCTAGCTACAACGA GTGCCCAA	4952
914	ACAUUGCC A CAGGAACA	1930	TGTTCTCT GGCTAGCTACAACGA GGCATGCT	4953
920	CCACAGGA A CAUAUUGU	1931	ACAATATG GGCTAGCTACAACGA TCCTGTGG	4954
922	ACAGGAAC A UAUUGUAC	1932	GTACAATA GGCTAGCTACAACGA GTTCTGTC	4955
924	AGGAACAU A UUGUACAA	1933	TGTACAAA GGCTAGCTACAACGA ATGTTCTC	4956
929	CAUAUUGU A CAAAAAUA	1934	ATTTTTCG GGCTAGCTACAACGA ACAATATG	4957
936	UACAAAAA A UCAAAUUG	1935	CATTTTGA GGCTAGCTACAACGA TTTTGTGA	4958
942	AAAUCAAA A UGUUGUUU	1936	AAAACACA GGCTAGCTACAACGA TTTGATTT	4959

Table 4 i

956	UUUAGGAA	A CUUCCUGU	1937	ACAGGAAG	GGCTAGCTACAACGA	TTCTTAA	4960
967	UCCUGUAA	A CAGGCCUA	1938	TAGGCCTG	GGCTAGCTACAACGA	TTACAGGA	4961
975	ACAGGCCU	A UUGAUUGG	1939	CCAATCAA	GGCTAGCTACAACGA	AGGCCTGT	4962
979	GCCUUAUG	A UUGGAAAG	1940	CTTTCCAA	GGCTAGCTACAACGA	CAATAGGC	4963
989	UGGAAAGU	A UGUCAACG	1941	CGTTGACA	GGCTAGCTACAACGA	ACTTTCCA	4964
995	GUUAUUGA	A CGAUUUGU	1942	ACAATTCG	GGCTAGCTACAACGA	TGACATAC	4965
999	GUCAAGCA	A UUGUGGUG	1943	ACCCACAA	GGCTAGCTACAACGA	TGCTTGAC	4966
1032	CCCCUUUC	A CGCAUUGU	1944	ACATTGCG	GGCTAGCTACAACGA	GAAGGGGG	4967
1037	UUCACGCA	A UUGGAAUA	1945	TATCCACA	GGCTAGCTACAACGA	TGCGTGA	4968
1043	CAUUGUGG	A UAUUCUGC	1946	GCAGAATA	GGCTAGCTACAACGA	CCACATTG	4969
1045	AUGUGGAU	A UUCUGCUU	1947	AAGCAGAA	GGCTAGCTACAACGA	ATCCACAT	4970
1056	CUGCUUUA	A UGCUUUUA	1948	TAAAGGCA	GGCTAGCTACAACGA	TAAAGCAG	4971
1064	AUGCCUUU	A UAUCAUGG	1949	CATGCATA	GGCTAGCTACAACGA	AAAGGCAT	4972
1066	GCCUUUAU	A UGCAUGCA	1950	TGCAATGA	GGCTAGCTACAACGA	ATAAAGGC	4973
1070	UUUAUUGC	A UGCAUACA	1951	TGTATGCA	GGCTAGCTACAACGA	GCATATAA	4974
1074	AUGCAUGC	A UACAAGCA	1952	TGCTTGTG	GGCTAGCTACAACGA	GCATGCAT	4975
1076	GCAUGCAU	A CAAGCAAA	1953	TTTGCTTG	GGCTAGCTACAACGA	TGACTATG	4976
1085	CAGCAAAA	A CAGGCUUU	1954	AAAGCCGT	GGCTAGCTACAACGA	TTTGCTTG	4977
1095	AGGCUUUU	A CUUUUUCG	1955	CGAGAAAG	GGCTAGCTACAACGA	AAAAGCCT	4978
1107	UCUCGCCA	A CUUACAGG	1956	CTTGTAAG	GGCTAGCTACAACGA	TGGCGAGA	4979
1111	GCCAACUU	A CAGGCGCU	1957	AGGCCTTG	GGCTAGCTACAACGA	AAGTTGGC	4980
1130	CUAAGUAA	A CAGUUGU	1958	ACATACTG	GGCTAGCTACAACGA	TTACTTAG	4981
1135	UAAACAGU	A UGUGAACC	1959	GGTTACAA	GGCTAGCTACAACGA	ACTGTTTA	4982
1141	GUUAUGUA	A CCUUUACC	1960	GGTAAAGG	GGCTAGCTACAACGA	TCACATAC	4983
1147	GAACCUUU	A CCCGUGUG	1961	CAACGGGG	GGCTAGCTACAACGA	AAAGGTTT	4984
1163	GUUCGGCA	A CGGCGUGG	1962	CCAGGGCG	GGCTAGCTACAACGA	TGCCGAGC	4985
1175	CCUGGUCU	A UGCCAAGU	1963	ACTTGGCA	GGCTAGCTACAACGA	AGACCAGG	4986
1192	GUUUGCUG	A CGCAACCC	1964	GGGTTCGG	GGCTAGCTACAACGA	CAGCAAAC	4987
1197	CUGACGCA	A CCCCACU	1965	AGTGGGGG	GGCTAGCTACAACGA	TGCTTCAG	4988
1203	CAACCCCC	A CUGGUUGG	1966	CCAACCAG	GGCTAGCTACAACGA	GGGGTTTG	4989
1221	GUUCUGGC	A UAGGCCAU	1967	ATGGCCTA	GGCTAGCTACAACGA	GGCCAAGC	4990
1228	CAUAGGCC	A UCAGCGCA	1968	TGCGCTGA	GGCTAGCTACAACGA	GGCTATG	4991
1236	AUCAGCGC	A UGCUGUGA	1969	TCCACGCA	GGCTAGCTACAACGA	GCCTGAT	4992
1245	UGCGUGGA	A CCUUUGUG	1970	CACAAAGG	GGCTAGCTACAACGA	TCCACGCA	4993
1266	CUUUGCCG	A UCUAUACC	1971	GGTATGGA	GGCTAGCTACAACGA	CGGCAGAG	4994
1270	GCCGAUCC	A UACCGCGG	1972	CCGCGGTA	GGCTAGCTACAACGA	GGATCGGC	4995
1272	CGAUCCAU	A CCGCGGAA	1973	TTCCGGGG	GGCTAGCTACAACGA	ATGGATCG	4996
1280	ACCGCGGA	A CUCCUAGC	1974	GCTAGGAG	GGCTAGCTACAACGA	TCCCGGCT	4997
1322	GGGGCAAA	A CUCAUCCG	1975	CCGATGAG	GGCTAGCTACAACGA	TTTGCGCC	4998
1326	CAAAACUC	A UCGGGACU	1976	AGTCCCGA	GGCTAGCTACAACGA	GAGTTTGT	4999
1332	UCAUCCGG	A CUGACAAU	1977	ATTGTGAC	GGCTAGCTACAACGA	CCCAGTGA	5000
1336	CGGACGUC	A CAUUCUGG	1978	CAGAATTG	GGCTAGCTACAACGA	CAGTCCCG	5001
1339	GACUGACA	A UUCUGUGG	1979	CGACAGAA	GGCTAGCTACAACGA	TGTCAGTC	5002
1361	UCCCGCAA	A UUAUACUC	1980	GATGTATA	GGCTAGCTACAACGA	TTGGGGGA	5003
1363	CCGCAAAU	A UACAUAU	1981	ATGATGTA	GGCTAGCTACAACGA	ATTTCGGG	5004
1365	GCAAAUUA	A CAUCAUUA	1982	AAATGATG	GGCTAGCTACAACGA	ATATTTGC	5005
1367	AAAUUAUC	A UCAUUUCC	1983	GGAAATGA	GGCTAGCTACAACGA	GATATATT	5006
1370	UAUACAUC	A UUCUUAUG	1984	CATGGAAA	GGCTAGCTACAACGA	GATGTATA	5007
1376	UCAUUUCC	A UUGUCUGU	1985	AGCAGCCA	GGCTAGCTACAACGA	GGAAATGA	5008
1399	UGCUGCCA	A CUGGAUCC	1986	GGATCCAG	GGCTAGCTACAACGA	TGGCAGCA	5009
1404	CCAACUGG	A UCUUACGC	1987	GCATAGGA	GGCTAGCTACAACGA	CCAGTTGG	5010

Table 41

1409	UGGAUCCU	A	CGCGGGAC	1988	GTCCCGCG	GGCTAGCTACAACGA	AGGATCCA	5011
1416	UACGCGGG	A	CGUCCUUU	1989	AAAGGACG	GGCTAGCTACAACGA	CCCGCGTA	5012
1429	CUUUGUUU	A	CGUCCCGU	1990	ACGGGACG	GGCTAGCTACAACGA	AAACAAAG	5013
1447	GGCGCGUA	A	UCCCGCGG	1991	CCGCGGGA	GGCTAGCTACAACGA	TCAAGGCC	5014
1456	UCCCGCGG	A	CGACCCCU	1992	AGGGGTGC	GGCTAGCTACAACGA	CCGCGGGA	5015
1459	CGCGGACG	A	CCCCUCCU	1993	GGGAGGGG	GGCTAGCTACAACGA	CGTCCGCG	5016
1486	GGGGGCUU	A	CGCGCCGC	1994	CGGGGGCG	GGCTAGCTACAACGA	AGAGCCCC	5017
1505	CUCGCGCU	A	UUGUACCG	1995	CGGTACAA	GGCTAGCTACAACGA	AGCGGAGG	5018
1510	CCUAAUUG	A	CCGACCGU	1996	ACGGTCCG	GGCTAGCTACAACGA	ACAAATAGG	5019
1514	UUGUACCG	A	CCGUGCCAC	1997	GTGGACGG	GGCTAGCTACAACGA	CGGTACAA	5020
1521	GACCGUCC	A	CGGGGCGC	1998	CGCGCCCG	GGCTAGCTACAACGA	GGACGGTC	5021
1530	CGGGGCGC	A	CCUCUCUU	1999	AAGAGAGG	GGCTAGCTACAACGA	CGCGCCCG	5022
1540	CUCUCUUU	A	CGCGGACU	2000	AGTCCGCG	GGCTAGCTACAACGA	AAAGAGAG	5023
1546	UUAACGCG	A	CUCGCCGU	2001	ACGGGGAG	GGCTAGCTACAACGA	CCGCTGAA	5024
1567	GCCUUCUC	A	UCUGCCCG	2002	CCGGCAGA	GGCTAGCTACAACGA	GAGAAGGC	5025
1576	UCUGCCCG	A	CCGUGGUC	2003	GCACACGG	GGCTAGCTACAACGA	CCGGCAGA	5026
1585	CCGUGUCC	A	CUUGCGUU	2004	AAGCGAAG	GGCTAGCTACAACGA	GCACCGAG	5027
1595	UUCGCUUC	A	CCUCUGCA	2005	TGCAGAGG	GGCTAGCTACAACGA	GAAGCGAA	5028
1603	ACCTUCUG	A	CGUGCGAU	2006	ATGCGACG	GGCTAGCTACAACGA	GCAGAGGT	5029
1610	CACGUCGC	A	UGGAGACC	2007	GGTCTCCA	GGCTAGCTACAACGA	GGACGGTC	5030
1616	GCAUGGAG	A	CCACCGUG	2008	CACGGTGG	GGCTAGCTACAACGA	CTCCATGC	5031
1619	UGGAGACC	A	CCGUGAAC	2009	GTTACAGG	GGCTAGCTACAACGA	GGTCTCCA	5032
1626	CACCGUGA	A	CGCCCAAC	2010	TGTGGGCG	GGCTAGCTACAACGA	TACGGGTG	5033
1638	CCACAGGA	A	CCGCCCCA	2011	TGGGCGAG	GGCTAGCTACAACGA	TCTGTGGG	5034
1656	GGUUCUUC	A	UAAGAGGA	2012	TCCTCTTA	GGCTAGCTACAACGA	GCAAGACC	5035
1664	AUAAGAGG	A	CUCUUGGA	2013	TCCAAGAG	GGCTAGCTACAACGA	CCTCTTAT	5036
1672	ACUUCUUG	A	CUUUCAGC	2014	GCTGAAGG	GGCTAGCTACAACGA	CCAAGAGT	5037
1682	UUUCAGCA	A	UGUCAAAG	2015	CGTTGACA	GGCTAGCTACAACGA	TGCTGAAA	5038
1688	CAAUGUCA	A	CGACCGAG	2016	GTGCGTCG	GGCTAGCTACAACGA	TGACATTG	5039
1691	UGUCAAAG	A	CCGACCUU	2017	AAGGTCCG	GGCTAGCTACAACGA	CCTTGACA	5040
1695	AACGACCG	A	CCUUGAGG	2018	CCTCAAGG	GGCTAGCTACAACGA	CGGTCTGT	5041
1705	CUUGAGGC	A	UAUUUCAA	2019	TTGAAGTA	GGCTAGCTACAACGA	GCCTCAAG	5042
1707	UGAGGCAU	A	CUUCAAAG	2020	CTTTGAAG	GGCTAGCTACAACGA	ATGCTCTA	5043
1716	CUUCAAAG	A	CUGUGUGU	2021	ACACACAG	GGCTAGCTACAACGA	CTTTGAAG	5044
1728	UGUGUUUA	A	UGAGUGGG	2022	CCCATCTA	GGCTAGCTACAACGA	TAAACACA	5045
1774	GUCUUUGU	A	CUAGGAGG	2023	CCTCTTAG	GGCTAGCTACAACGA	ACAAAGAC	5046
1791	CUGUAGGC	A	UAAUUUGG	2024	CCAAATTA	GGCTAGCTACAACGA	GCCTACAG	5047
1795	AGGCAUAA	A	UUGGUGUG	2025	CACACCAA	GGCTAGCTACAACGA	TTATGCTT	5048
1807	GUGUGUUC	A	CCGACACC	2026	GGTGTCTG	GGCTAGCTACAACGA	GAACACAC	5049
1813	UCACCAGC	A	CCAUGCAA	2027	TTGCTATG	GGCTAGCTACAACGA	GCTGGTGA	5050
1816	CCAGCACG	A	UGCAACUU	2028	AAGTTGCA	GGCTAGCTACAACGA	GGTGTCTG	5051
1821	ACUAGUCC	A	CUUUUCAA	2029	TGAAGGAG	GGCTAGCTACAACGA	TGCTATGT	5052
1829	ACUUUUUC	A	CCUCUGCC	2030	GGCAGAGG	GGCTAGCTACAACGA	GAAGAGAT	5053
1840	CUUGCCUA	A	UCAUCUCA	2031	TGAGATGA	GGCTAGCTACAACGA	TAGGCAGA	5054
1843	GCCUAAUC	A	UCUCAUGU	2032	ACATGAGA	GGCTAGCTACAACGA	GATTAGGC	5055
1848	AUCUACUC	A	UGUUCAGU	2033	CATGAACA	GGCTAGCTACAACGA	GAGATGAT	5056
1854	UAUGUUCU	A	UGUCCUAC	2034	GTAGGACA	GGCTAGCTACAACGA	GAACATGA	5057
1861	CAUUGUCU	A	CUGUUCAA	2035	TTGAAGAG	GGCTAGCTACAACGA	AGGACATG	5058
1903	UUUGGGGC	A	UGUACAUU	2036	AATGTCCA	GGCTAGCTACAACGA	GCCCAAAA	5059
1907	GGGCAUGG	A	CAUUGACC	2037	GGTCAATG	GGCTAGCTACAACGA	CCATGCCC	5060
1909	GCAUGGAC	A	UUGAACCG	2038	CGGTCCAA	GGCTAGCTACAACGA	GTCCATGC	5061

Table 4 i

1913	GGACAUG A	CCCGUAUA	2039	TATACGGG	GGCTAGCTACAACGA	CAATGTCC	5062
1919	UGACCCGU A	UAAAGAAU	2040	ATTCTTTA	GGCTAGCTACAACGA	ACGGGTCA	5063
1926	UAUAAAGA A	UUUGGAGC	2041	GCTCCAAA	GGCTAGCTACAACGA	TCITTTATA	5064
1947	GUGGAGUU A	CUCUCUUU	2042	AAAGAGAG	GGCTAGCTACAACGA	AACTCCAC	5065
1967	GUUCUCUG A	CUCUCUUU	2043	GAAAGAAG	GGCTAGCTACAACGA	CAGAAGGC	5066
1981	UUCUCUUC A	UUCGGAUA	2044	ATCTCGAA	GGCTAGCTACAACGA	AGAAGGAA	5067
1988	UAUUCGAG A	UCUCCUCG	2045	CGAGGAGA	GGCTAGCTACAACGA	CTCGAATA	5068
1997	UCUCUCUG A	CACCGCCU	2046	AGGCGGTG	GGCTAGCTACAACGA	CGAGGAGA	5069
1999	UUCUGGAC A	CCGCTCUC	2047	AGAGGCGG	GGCTAGCTACAACGA	GTCGAGGA	5070
2015	UGUCUCUG A	UCGGGGGG	2048	CCCCCGGA	GGCTAGCTACAACGA	ACAGAGCA	5071
2040	UCUCGGGA A	CAUUGUUC	2049	GAACAATG	GGCTAGCTACAACGA	TCCGGAGA	5072
2042	UCCGGAAC A	UUGUUCAC	2050	GTGAACAA	GGCTAGCTACAACGA	GTTCGGGA	5073
2049	CAUUGUUC A	CCUCACCA	2051	TGCTGAGG	GGCTAGCTACAACGA	GAACAATG	5074
2054	UAUCCGUC A	CCAUCGCG	2052	CGGTATGG	GGCTAGCTACAACGA	GAGGTGAA	5075
2057	ACUCACAC A	UACGCGAC	2053	GTGCGGTA	GGCTAGCTACAACGA	GCTGAGGT	5076
2059	CCACCAUA A	CGGCAUCU	2054	GAGTGCGG	GGCTAGCTACAACGA	ATGGTGAG	5077
2064	CAUACGGC A	CCACGACA	2055	TGCTGTAG	GGCTAGCTACAACGA	GCCGTATG	5078
2077	GGCAAGCU A	UUCUGUGU	2056	ACACAGAA	GGCTAGCTACAACGA	AGCTTGCC	5079
2098	GUGGAGUU A	UGAAUUAU	2057	TAGATTCA	GGCTAGCTACAACGA	CAACTCAC	5080
2102	GUUGAGUA A	UCUAGCCA	2058	TGGCTAGA	GGCTAGCTACAACGA	TCATCAAC	5081
2110	AUUCAGCC A	CCUGGGUG	2059	CACCCAGG	GGCTAGCTACAACGA	GGCTAGAT	5082
2126	GGGAAGUA A	UUUGGAAG	2060	CTTCCAAA	GGCTAGCTACAACGA	TACTTCCC	5083
2135	UUUGGAAG A	UCCAGCAU	2061	ATGCTGGA	GGCTAGCTACAACGA	CTTCCAAA	5084
2142	GAUCCAGC A	UCCAGGCA	2062	TCCCTGGA	GGCTAGCTACAACGA	GCTGGATC	5085
2151	UCCAGGGA A	UUAGUAUG	2063	ACTACTAA	GGCTAGCTACAACGA	TCCCTGGA	5086
2165	AGUCAGCU A	UGUCAACG	2064	CGTTGACA	GGCTAGCTACAACGA	AGCTGACT	5087
2171	CUAUGUCA A	CGUUAUAU	2065	TATTAACG	GGCTAGCTACAACGA	TGACATAG	5088
2177	CAACGUUA A	UAUGGGCC	2066	GGCCCAAT	GGCTAGCTACAACGA	TACGTGTG	5089
2179	ACGUUAUA A	UUGGGCUA	2067	TAGGCCCA	GGCTAGCTACAACGA	ATTAAAGT	5090
2191	GUUCUAAA A	UCAGACAA	2068	TTGTCTGA	GGCTAGCTACAACGA	TTTATAGC	5091
2196	AAAAUCAG A	CAACUAUU	2069	AATAGTTG	GGCTAGCTACAACGA	CTGATTTT	5092
2199	AUCAGACA A	CUAUUGUG	2070	CACAATAG	GGCTAGCTACAACGA	TGCTTGAT	5093
2202	AGACAACU A	UUUGGGUG	2071	AACCAACA	GGCTAGCTACAACGA	AGTTGTCT	5094
2213	GUGGUUUC A	CAUUCUCC	2072	AGGAAATG	GGCTAGCTACAACGA	GAACCCAC	5095
2215	GGUUCUAC A	UUUCUUGU	2073	ACAGGAAA	GGCTAGCTACAACGA	GTGAAACC	5096
2227	CCUGUCU A	CUUUUGGG	2074	CCCAAAAG	GGCTAGCTACAACGA	AAGACAGG	5097
2242	GGCGAGAA A	CUGUUCU	2075	AAGAACAG	GGCTAGCTACAACGA	GCAGGAGG	5098
2253	GUUCUUGA A	UAUUUGUG	2076	ACCAAAAT	GGCTAGCTACAACGA	TCAAGAAC	5099
2255	UUCUGAUA A	UUUGUGUG	2077	ACACCAAA	GGCTAGCTACAACGA	ATTCAAGA	5100
2278	GAUGUGUG A	UUCGCAUC	2078	AGTGCGAA	GGCTAGCTACAACGA	CCACACTC	5101
2284	GGAUUCGC A	CUCUCUCU	2079	AGGAGGAG	GGCTAGCTACAACGA	GCGAATCC	5102
2295	CCUCCUGC A	UAUAGACC	2080	GGTCTATA	GGCTAGCTACAACGA	GCAGGAGG	5103
2297	UCCUGCAU A	UAGACCAC	2081	GTGGTCTA	GGCTAGCTACAACGA	ATGCAGGA	5104
2301	GCAUUAUG A	CCACCAAA	2082	TTTGGTGG	GGCTAGCTACAACGA	GTATATGC	5105
2304	UAUAGACC A	CCAAUUGC	2083	GCATTTGG	GGCTAGCTACAACGA	GGTCTATA	5106
2309	ACCACCAA A	UGCCCCUA	2084	TAGGGGCA	GGCTAGCTACAACGA	TTGGTGGT	5107
2317	AUGCCCCU A	UCUUAUCA	2085	TGATAAGA	GGCTAGCTACAACGA	AGGGGATC	5108
2322	CCUAUCUU A	UCAAACAU	2086	AGTGTGTA	GGCTAGCTACAACGA	AGATATGG	5109
2326	UCUUAUCA A	UUCUCCCG	2087	CGGAAGTG	GGCTAGCTACAACGA	TGATAGAA	5110
2328	UAUUCAAC A	CUUCCGGA	2088	TCCGGAAG	GGCTAGCTACAACGA	GTTGATAA	5111
2338	UUCCGGAA A	CUACUGUU	2089	AACAGTAG	GGCTAGCTACAACGA	TTCCGGAA	5112

Table 4 i

2341	CGGAACU A CUGUUGU	2090	AACAACG GGCTAGCTACAACGA AGTTCCG	5113
2352	GUUGUUG A CGAAGAGG	2091	CCTCTTCG GGCTAGCTACAACGA CTAACAAC	5114
2380	GAAGAAGA A CUCCUUCG	2092	CGAGGGAG GGCTAGCTACAACGA TCCTCTTC	5115
2397	CCUCGCAG A CGAAGUC	2093	GACCTTCG GGCTAGCTACAACGA CTGCGAGG	5116
2409	AGGUUCU A UCGCCCG	2094	CGCGGGCA GGCTAGCTACAACGA TGAGACCT	5117
2427	CGAGAGU A UCUCAAUC	2095	GATTGAGA GGCTAGCTACAACGA CTTCTCGG	5118
2433	AGAUCUCA A UCUCGGGA	2096	TCCCGAGA GGCTAGCTACAACGA TGAGATCT	5119
2442	UCUCGGGA A UCUCAAUG	2097	CATTGAGA GGCTAGCTACAACGA TCCCGAGA	5120
2448	GAUUCUCA A UGUUAGUA	2098	TACTAACA GGCTAGCTACAACGA TGAGATCT	5121
2456	AUGUUGU A UUCUUGG	2099	CCAAGGAA GGCTAGCTACAACGA ACTAACAT	5122
2465	UUCUUGG A CACAUAAG	2100	CTTATGTG GGCTAGCTACAACGA CCAAGGAA	5123
2467	CCUUGGAC A CAUAAGGU	2101	ACCTTATG GGCTAGCTACAACGA GTCCAAGG	5124
2469	UUGGACAC A UAAUGUGG	2102	CCACCTTA GGCTAGCTACAACGA GTGTCCAA	5125
2481	GGUGGGAA A CUUACGG	2103	CGGTAAAG GGCTAGCTACAACGA TTCCACC	5126
2486	GAACUUU A CGGGCGUU	2104	AAGCCCCG GGCTAGCTACAACGA AAAGTTTC	5127
2496	GGGCUUU A UUCUUCU	2105	TAGAAGAA GGCTAGCTACAACGA AAAGCCCC	5128
2504	AUUCUUU A CGUACUU	2106	AGGTACCG GGCTAGCTACAACGA AGAAGAT	5129
2509	UCUACGGU A CCUUGUU	2107	AAGCAAGG GGCTAGCTACAACGA ACCGTAGA	5130
2520	UUGCUUU A UCCUAAU	2108	ATTAGGAA GGCTAGCTACAACGA TAAAGCAA	5131
2527	AAUUCUUA A UGGCAAC	2109	GTTCGCAA GGCTAGCTACAACGA TTAGGATT	5132
2534	AAUGCAA A CUUCUUU	2110	AGAAGGAG GGCTAGCTACAACGA TTGCCATT	5133
2550	UUUCCUG A CAUUAUU	2111	AATGAATG GGCTAGCTACAACGA CAGAGAAA	5134
2552	UUCUGAC A UUAUUUG	2112	CAAAATGA GGCTAGCTACAACGA GTCAGGAA	5135
2556	UGACAUUC A UUUGAGG	2113	CCTGCAAA GGCTAGCTACAACGA GAATGTCA	5136
2568	GCAGGAG A CAUUGUUG	2114	CAACAATG GGCTAGCTACAACGA CTCTCTGC	5137
2570	AGGAGGAC A UUGUUGU	2115	ATCAACAA GGCTAGCTACAACGA GTCTCTCT	5138
2577	CAUUGUUG A UAGAUGUA	2116	TACATCTA GGCTAGCTACAACGA CAACAATG	5139
2581	GUUGAUG A UGUUAGCA	2117	TGCTTACA GGCTAGCTACAACGA CTATCAAC	5140
2590	UGUAAGCA A UUUGUGG	2118	CCACAAA GGCTAGCTACAACGA TGCTTACA	5141
2606	GGCCCCU A CAGUAAU	2119	ATTTACTG GGCTAGCTACAACGA AAGGGGCC	5142
2613	UACAGUA A UGAAACA	2120	TGTTTACA GGCTAGCTACAACGA TTACTGTA	5143
2619	AAUUGAAA A CAGGAGC	2121	GTCTCCTG GGCTAGCTACAACGA TTTCATT	5144
2626	AACAGGAG A CUUAAUU	2122	AATTTAAG GGCTAGCTACAACGA CTCTGT	5145
2632	AGACUUA A UUAACUUA	2123	ATAGTTAA GGCTAGCTACAACGA TTAAGTCT	5146
2636	UUAUUAU A CUUUGCU	2124	AGGCATAG GGCTAGCTACAACGA TAAATTA	5147
2639	AUUUAU A UGCUGCU	2125	AGCAGGCA GGCTAGCTACAACGA AGTTAATT	5148
2655	UUGGUUU A UCCAAUG	2126	CATTGGGA GGCTAGCTACAACGA AAAACCTA	5149
2661	UUAUCCA A UGUUAUA	2127	TAGTAACA GGCTAGCTACAACGA TGGATATA	5150
2666	CCAUGUU A CUAAUUA	2128	ATATTAGG GGCTAGCTACAACGA TTGATGCG	5151
2671	GUUACUA A UAUUUGC	2129	GGCAATA GGCTAGCTACAACGA TTAGTAAC	5152
2673	UACUAAU A UUUGCCU	2130	AGGGCAAA GGCTAGCTACAACGA ATTTAGTA	5153
2685	GCCCUUAG A UAAAGGA	2131	TCCCTTGA GGCTAGCTACAACGA CTAGGGCC	5154
2693	AUAAAGGG A UCAAAACG	2132	CGGTTTGA GGCTAGCTACAACGA CCGTTTAT	5155
2698	GGGAUCAA A CCGUUAU	2133	TAATACGG GGCTAGCTACAACGA TTGATCCC	5156
2703	CAAACCGU A UUAUCCAG	2134	CTGGATAA GGCTAGCTACAACGA ACGGTTTG	5157
2706	ACCGUAU A UCCAGAGU	2135	ACTCTGGA GGCTAGCTACAACGA AATACGGT	5158
2715	UCCAGAGU A UGUUAUA	2136	TAACTACA GGCTAGCTACAACGA ACTCTGGA	5159
2724	UGUAGUUA A UCAUUAU	2137	AGTAATGA GGCTAGCTACAACGA TAACCTACA	5160
2727	AGUUAUUC A UUUCUCC	2138	GGAAAGTA GGCTAGCTACAACGA GATTAACT	5161
2730	UAUUAUUA A CUUCCAGA	2139	TCTGGAGG GGCTAGCTACAACGA AATGATT	5162
2738	ACUUCAG A CGGACAU	2140	ATGTGCGG GGCTAGCTACAACGA CTGGAAGT	5163

Table 4 i

2743	CAGACGCG A CAUUUUUU	2141	AAATAATG GGCTAGCTACAACGA CGCGTCTG	5164
2745	GACGCGAC A UUAUUUAC	2142	GTAATAAA GGCTAGCTACAACGA GTCGCGTC	5165
2748	GCGACAUU A UUUACACA	2143	TGTGTAAA GGCTAGCTACAACGA AATGTGCG	5166
2752	CAUUUUUU A CACACUUC	2144	AGAGTGTG GGCTAGCTACAACGA AATAATG	5167
2754	UUUUUUUU A CACUUCUU	2145	AAAGAGTG GGCTAGCTACAACGA GTAAATAA	5168
2756	AUUUACAC A CUCUUUGG	2146	CCAAAGAG GGCTAGCTACAACGA GTGTAAAT	5169
2774	AGGCGGGG A UCUUAUUU	2147	ATATAAGA GGCTAGCTACAACGA CCGCGCCT	5170
2779	GGGAUUCU A UAUAAAGG	2148	CTTTTATA GGCTAGCTACAACGA AAGATCCC	5171
2781	GAUCUUUU A UAAAAGAG	2149	CTCTTTTA GGCTAGCTACAACGA ATAAGATC	5172
2795	GAGAGUCC A CACGUAGC	2150	GCTACGTG GGCTAGCTACAACGA GGACTCTC	5173
2797	GAGUCCAC A CGUAGCGC	2151	GGCTACG GGCTAGCTACAACGA GTGGACTC	5174
2809	AGCGCCUC A UUUUGCGG	2152	CCGCAAAA GGCTAGCTACAACGA GAGGCGCT	5175
2821	UGCGGGUC A CCAUAUUC	2153	GAATATGG GGCTAGCTACAACGA GACCGCGA	5176
2824	GGGUACAC A UAUUCUUG	2154	CAAGAATA GGCTAGCTACAACGA GGTGACCC	5177
2826	GUACACAU A UUCUUGGG	2155	CCCAAGAA GGCTAGCTACAACGA ATGTGTAC	5178
2836	UCUUUGGA A CAAGAUCU	2156	AGATCTTG GGCTAGCTACAACGA TCCCAAGA	5179
2841	GGACAAAG A UCUACAGC	2157	GCTGTAGA GGCTAGCTACAACGA CTGTGTTC	5180
2845	CAAGAUCU A CAGCAUUG	2158	CCATGTGT GGCTAGCTACAACGA AGATCTTG	5181
2850	UCUACAGC A UGGGAGGU	2159	ACCTCCCA GGCTAGCTACAACGA GCTGTAGA	5182
2870	UCUUCCAA A CCUCGAAA	2160	TTTCGAGG GGCTAGCTACAACGA TTGGAGAA	5183
2883	GAAGAAGC A UGGGGACA	2161	TGTCCCCA GGCTAGCTACAACGA GCCTTTTC	5184
2889	GCAUGGGG A CAUAUUCU	2162	AAGATTGT GGCTAGCTACAACGA CCGCATGC	5185
2893	GGGGACAA A UCUUUCUG	2163	CAGAAGAA GGCTAGCTACAACGA TTGTCCCC	5186
2908	UGUCCCCA A UCCCUUGG	2164	CCAGGGGA GGCTAGCTACAACGA TGGGACA	5187
2918	CCCCUGGG A UUCUCCCC	2165	GGGAAGAA GGCTAGCTACAACGA CCGAGGGG	5188
2929	CUUCCCCG A UCAUCAGU	2166	ACTGATGA GGCTAGCTACAACGA CGGGGAAG	5189
2932	CCCCGAUC A UCAGUUGG	2167	CCAATGGA GGCTAGCTACAACGA GATCGGGG	5190
2941	UCAGUUGG A CCCUGCAU	2168	ATGCAAGG GGCTAGCTACAACGA CCACTGTA	5191
2948	GACCCUAG A UUCAAGGC	2169	GCTTTGAA GGCTAGCTACAACGA GCAGGGTC	5192
2959	CAAGGCCA A CUCAGUAA	2170	TTACTGAG GGCTAGCTACAACGA TGGCTTTG	5193
2968	CUCAGUAA A UCCAGAUU	2171	AACTGTGA GGCTAGCTACAACGA TTACTGAG	5194
2974	AAAUCCAG A UUGGAGCC	2172	GGTCCCAA GGCTAGCTACAACGA CTGAGATT	5195
2980	AGAUUGGG A CCUCAACC	2173	GGTTGAGG GGCTAGCTACAACGA CCAATCTC	5196
2986	GGACCUCA A CCGGACCA	2174	TGTGCGGG GGCTAGCTACAACGA TGAGGTCC	5197
2998	GCACAGAG A CAACUGGC	2175	GCCAGTTG GGCTAGCTACAACGA CTTGTGTC	5198
3001	CAAGGACA A CUGGCGCG	2176	CCGCGCAG GGCTAGCTACAACGA TGTCTTTC	5199
3010	CUGGCGCG A CGCAACCA	2177	TGTTGGCG GGCTAGCTACAACGA CCGGCGAG	5200
3016	GGACGCCA A CAGGGUUG	2178	CCACTTGT GGCTAGCTACAACGA TGGCGTCC	5201
3035	GUUGGAGC A UUCGAGCC	2179	GGCCCGAA GGCTAGCTACAACGA GCTCCAC	5202
3051	CAGGCUUC A CCCCUCCT	2180	GGGAGGGG GGCTAGCTACAACGA GAGCCCTG	5203
3061	CCCCCCCC A UGGGGGAG	2181	GTCCCCCA GGCTAGCTACAACGA GGGGAGGG	5204
3068	CAUGGGGG A CUGUUGGG	2182	CCCAACAG GGCTAGCTACAACGA CCGCCATG	5205
3088	GAGCCUCC A CGUCUAGG	2183	CCTGAGCG GGCTAGCTACAACGA GAGGGCTC	5206
3101	CAGGGCCU A CUCACAA	2184	GTTGTGAG GGCTAGCTACAACGA AGGCCCTG	5207
3105	GCUUACUC A CAACUGUG	2185	CACAGTTG GGCTAGCTACAACGA GAGTAGGC	5208
3108	UACUCACA A CUGUGCCA	2186	TGGCACAG GGCTAGCTACAACGA TGTGAGTA	5209
3138	CUGCGUCC A CCAAUCCG	2187	CCGATTGG GGCTAGCTACAACGA GGAGGCGA	5210
3142	CUCACACA A UCGGCAUG	2188	ACTGCCGA GGCTAGCTACAACGA TGGTGAGG	5211
3165	GGCAGCCU A CUCCUUUA	2189	TAAGGGAG GGCTAGCTACAACGA AGCTCGCC	5212
3173	ACUCCCUU A UCUCACCC	2190	GGTGAGGA GGCTAGCTACAACGA AAGGGAGT	5213
3179	UUAUUCUC A CCUCUAGG	2191	CTTAGAGG GGCTAGCTACAACGA GGAGATAA	5214

Table 4 i

3190	UCUAAAGG A CACUCAUC	2192	GATGAGTG GGCTAGCTACAACGA CCCTTAGA	5215
3192	UAAGGGAC A CUCAUCCU	2193	AGGATGAG GGCTAGCTACAACGA GTCCCTTA	5216
3196	GGACACUC A UCCUCAGG	2194	CCTGAGGA GGCTAGCTACAACGA GAGTGTCC	5217
3207	CUCAGGCC A UGCAGUGG	2195	CCA CTGCA GGCTAGCTACAACGA GGCTGAG	5218

Input Sequence = AF100308. Cut Site = YG/M or UG/U.

Stem Length = 8 . Core Sequence = GGCTAGCTACAACGA

AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 42

Table 42: Human HBV Amberzyme Ribozyme and Substrate Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
61	ACTUUCU G CUGUGGC	1448	GCACGAG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGGAACU	5219
87	GGACACU G AGCCUGC	1449	GCAGGCU GAGGGAACUCC CU UCAAGGACAUUGUCCGG ACUGUCC	5220
94	UGAGCCU G CUCAGAU	1450	AUUCUGA GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGGCGUA	5221
112	CGUUCU G CCAUAUG	1451	CGUAUGA GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGGACAG	5222
132	AUCUUAU G AGACUGG	1452	CCAGUCU GAGGGAACUCC CU UCAAGGACAUUGUCCGG GAUAGAU	5223
153	CCGUAUC G ACACUGA	1453	UCCAUUU GAGGGAACUCC CU UCAAGGACAUUGUCCGG GGUACAU	5224
169	AGACACU G CAUCAGG	1454	UCCUGAU GAGGGAACUCC CU UCAAGGACAUUGUCCGG GAUGUCU	5225
192	GGACCCU G CUCUGUU	1455	AACACGA GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGGCUCC	5226
222	UUCUGUU G ACRAAAU	1456	AUUUUUU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AACAGAA	5227
315	CANAUAU G CAGUCCA	1457	UGGACU GAGGGAACUCC CU UCAAGGACAUUGUCCGG GAUUUUU	5228
374	UGGUUAU G CUGGAUU	1458	ACAUCCA GAGGGAACUCC CU UCAAGGACAUUGUCCGG GAUAACA	5229
387	AUGGUUU G CGCGUUU	1459	AAACGCC GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGACACU	5230
410	CUUCUUC G CAUCUGC	1460	GCAGCAU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGAGGAG	5231
417	UGCNUCU G CUCUAUG	1461	CAUAACA GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGAUACA	5232
420	AUCCGCU G CUAAGCU	1462	AGGCAU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGCAGAU	5233
425	UGUUAU G CCUCUAU	1463	AGAUAGG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AUAGCAG	5234
468	CGUAUUU G CCGUUUG	1464	CMAAGCG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AACAUAC	5235
518	GGACCAU G CAAACCU	1465	AGUUUUU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AUGUUCG	5236
527	CANAACU G CACACUC	1466	GAUUUUU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGUUUUU	5237
538	CAACUUC G CAAUAGA	1467	UCCUUGG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGGAGUG	5238
569	CUCAGUU G CUUACAA	1468	UUUUAAG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AACAUAG	5239
596	GGAAACU G CACUGUA	1469	UACAGUG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AGUUUCG	5240
631	UGCUUUC G CAAAUAC	1470	GUUUUUU GAGGGAACUCC CU UCAAGGACAUUGUCCGG GAAACCC	5241
687	UUAACUG G CCAUUUG	1471	ACAAUUG GAGGGAACUCC CU UCAAGGACAUUGUCCGG ACUGAUA	5242
747	AUAAGAU G AUGUGUU	1472	AACCAAU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AUCCAAA	5243
783	CCAUUUU G AGUCCUU	1473	AAGGACU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AAGAUUU	5244
795	CCGUUAU G CGCUUUU	1474	AAACCGG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AUAAAGG	5245
796	UUUAUCC G CUGUAUC	1475	GUUAAG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AUAAAGG	5246
911	GGCACAU G CACAGAA	1476	UCCUUGG GAGGGAACUCC CU UCAAGGACAUUGUCCGG AAUUGCC	5247
978	GGCUAUI G AUUGAAA	1477	UUUCCAU GAGGGAACUCC CU UCAAGGACAUUGUCCGG AAUAGGC	5248

Table 42

997	AUGUAC G AAUUGG	1476	CCACAU GAGGAAACUCC CU UCAAGACAUUCUCCGG GIUGACAU	5249
1000	UGGGUUU G CCGCCUC	1479	AGGGCGG GAGGAAACUCC CU UCAAGACAUUCUCCGG AAACCCCA	5250
1023	GUUUGCC G CCCCUCU	1480	GAAGGGG GAGGAAACUCC CU UCAAGACAUUCUCCGG GGCAAC	5251
1034	CCUUCAC G CAUACUG	1481	CCACAU G GAGGAAACUCC CU UCAAGACAUUCUCCGG GUAAAG	5252
1050	GAUACU G CUUAUG	1482	CAUAAAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AGAAUUC	5253
1058	CCUUAU G CCUUAU	1483	UAUAAAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AUUAAAG	5254
1062	CUUAU G CAUGCA	1484	UAUGUUG GAGGAAACUCC CU UCAAGACAUUCUCCGG AUUAAG	5255
1078	AUUAUG G CAUACAG	1485	CUUAU G GAGGAAACUCC CU UCAAGACAUUCUCCGG AUGCAU	5256
1103	ACUUCUC G CCAUAU	1486	UAAGUUG GAGGAAACUCC CU UCAAGACAUUCUCCGG GAGAAU	5257
1139	CAGUAU G ACCCUA	1487	UAAGUUU GAGGAAACUCC CU UCAAGACAUUCUCCGG ACUACU	5258
1155	ACCCGUU G CUGGCA	1488	UUGCCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AAGGUG	5259
1177	UGUUAU G CCAAGU	1489	ACACUUG GAGGAAACUCC CU UCAAGACAUUCUCCGG AUAGACA	5260
1188	AAGUUU G CUGACCA	1490	UGGUCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AAACAU	5261
1191	UGUUGU G AGCAACC	1491	GUUCCU GAGGAAACUCC CU UCAAGACAUUCUCCGG AGCAACA	5262
1194	UGUGAC G CAACUCC	1492	GGGUGU GAGGAAACUCC CU UCAAGACAUUCUCCGG GUCAGAA	5263
1234	CAUUGC G CAUGCCU	1493	CAGCAU GAGGAAACUCC CU UCAAGACAUUCUCCGG GUCAGU	5264
1238	CAGCCAU G CUGGAC	1494	GUCCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AUGCCU	5265
1262	UCUCCU G CCGAUCA	1495	UGCAUCG GAGGAAACUCC CU UCAAGACAUUCUCCGG AGAGAGA	5266
1265	CUUGCC G AUCCUAC	1496	GUUGAU GAGGAAACUCC CU UCAAGACAUUCUCCGG GGCAGG	5267
1275	UCAUCC G CGAACUC	1497	GACUCC GAGGAAACUCC CU UCAAGACAUUCUCCGG GGUAUGA	5268
1290	UCCUACC G CUUUAU	1498	AAACAG GAGGAAACUCC CU UCAAGACAUUCUCCGG GGUAUGA	5269
1299	CUUUAU G CUGGAC	1499	GUCCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG AAACAG	5270
1303	UUUGUC G CAGAGGU	1500	ACUUGU GAGGAAACUCC CU UCAAGACAUUCUCCGG GAGCAAA	5271
1335	UGGACU G ACAUUC	1501	AGAUUU GAGGAAACUCC CU UCAAGACAUUCUCCGG AUUCCGA	5272
1349	UCUUGU G CUUCCG	1502	GGGAGG GAGGAAACUCC CU UCAAGACAUUCUCCGG AGCAAGA	5273
1357	GUUCCU G CAAUAU	1503	UAUAU GAGGAAACUCC CU UCAAGACAUUCUCCGG GGGAGAG	5274
1392	CAUUGU G CUAGCUG	1504	CAGUUG GAGGAAACUCC CU UCAAGACAUUCUCCGG AGCCAU	5275
1392	UAGUUG G CUGCAG	1505	GUUGCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG ACAGCUA	5276
1399	CGUUGU G CCAUUG	1506	CAGUUG GAGGAAACUCC CU UCAAGACAUUCUCCGG AGCAAG	5277
1411	GAUUCAC G GAGAGGU	1507	ACUCCCG GAGGAAACUCC CU UCAAGACAUUCUCCGG GGGAGAG	5278
1442	CGUUGG G CUGAUU	1508	GAUUCAG GAGGAAACUCC CU UCAAGACAUUCUCCGG GGCAAG	5279
1445	UGGGGU G AUUCCG	1509	GGGGAU GAGGAAACUCC CU UCAAGACAUUCUCCGG AGCCGGA	5280
1452	UGAUUCC G CGAACAC	1510	GUUGUC GAGGAAACUCC CU UCAAGACAUUCUCCGG GUUAUUA	5281
1458	CCGCGAC G ACCUCC	1511	GAGGGGU GAGGAAACUCC CU UCAAGACAUUCUCCGG GUCCCGG	5282

Table 42

1474	CGGGGCG G CCGGGGC	1512	GGCCGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GCGCCCGG	5283
1489	GGUACCG G CCGGUCG	1513	GGAGCGG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GGAGGAG	5284
1493	UACGCGG G CCGUCGCG	1514	GGAGGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GCGCGGUA	5285
1501	GGUUCUCC G CGUAUUG	1515	ACAUAUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GGAGGAG	5286
1513	AUUGUCC G ACCGUCA	1516	UGAGCGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG GGUACAU	5287
1528	CACGGGC G CACUUC	1517	GGAGGUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GCGCCGUG	5288
1542	CGUUUAG G CGGUAUC	1518	GGGCGCG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GUAAAGG	5289
1559	CGGUUG G CCGUCGA	1519	UGAGGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACAGCGG	5290
1571	CGUACU G CGGACCG	1520	GGGUCGG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGAUGAG	5291
1583	GACGUGU G CACUFGC	1521	GGAGGUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACAGGUC	5292
1590	UGAGUUC G CUUGUCU	1522	AGUUGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GAAGUGCA	5293
1601	UACCCU G CACGUGC	1523	GGACGUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGAGGUGA	5294
1608	UGAGCUC G CAUGGAGA	1524	UCUCCAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GACGUGCA	5295
1624	ACCACGU G AACGCCA	1525	UGGCGUU GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACGUGGU	5296
1628	CGUGAAC G CCGCAGG	1526	CGUGGCG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GUUCGCG	5297
1642	AGGAAU G CCGCAGG	1527	ACCUUGG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGGUUCU	5298
1654	AGUGUUC G CAUAGAG	1528	CUUUAUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AAGACUU	5299
1690	AUGUAA G ACCGACU	1529	AGUUCGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG GUUGACAU	5300
1694	CGAGAC G ACCTUFG	1530	CUAAGGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG GGGUGUG	5301
1700	CGAGUU G AGGUAAC	1531	GUUUGCU GGAGGAAACUCC CU UCAAGGACAUUCGCGG AAGGUCG	5302
1730	UGUUUAA G AGUGGAG	1532	CUCCACU GGAGGAAACUCC CU UCAAGGACAUUCGCGG AUUAACA	5303
1818	AGACCAU G CAUCUUU	1533	AAAGUUG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AUHUGCU	5304
1835	UCACUUC G CUUAUUA	1534	UGAUUAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGAGGUGA	5305
1883	CAGGUGU G CCGUGGU	1535	ACCGAGG GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACACUUG	5306
1912	UGUUUUU G CCGUCUGA	1536	AUACGGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG AAUGUGCA	5307
1959	UCUUUUU G CCGUCUGA	1537	UCAGGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG ABAAGA	5308
1966	UGUUUUU G AGUUCUU	1538	AAAGAGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGAGGCA	5309
1985	UUCUUUC G AGAUUCU	1539	GGAGUUC GGAGGAAACUCC CU UCAAGGACAUUCGCGG GAUUGGA	5310
1996	AUUCUUC G ACACCGC	1540	GCGGUGU GGAGGAAACUCC CU UCAAGGACAUUCGCGG GAGAGAU	5311
2002	UGAGACC G CCGUCGU	1541	AGCAGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG GGUUGGGA	5312
2008	CGCGGCU G CUCUGUA	1542	AUACGAG GGAGGAAACUCC CU UCAAGGACAUUCGCGG AGAGGCGG	5313
2022	GUUGGGU G AGUUGAG	1543	CAUCAUC GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACCCGAC	5314
2097	GGUGUU G AGGUAUC	1544	AGAUUCA GGAGGAAACUCC CU UCAAGGACAUUCGCGG ACUCUCC	5315
2100	GAGUUGU G AAUCUAG	1545	CGUAUUA GGAGGAAACUCC CU UCAAGGACAUUCGCGG AUCAACU	5316

Table 42

2237	UUUUGGGC G AGAAACUG	1546	CAGUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GGCABAAA	5317
2251	CUUUUUU G AAUUUUU	1547	CAUAUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGAACAG	5318
2282	GGGAUUU G CAGUCCU	1548	GGAGGUG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GAUUCAC	5319
2293	CUUUUUU G CAGUUUA	1549	UUUAUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAGGAG	5320
2311	CACAAUU G CCUUAUC	1550	GAUAGGG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AUUUGUG	5321
2354	UUUAGAC G AAGAGCA	1551	UUCUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GUUUAACA	5322
2388	ACCCUUU G CCUGGAG	1552	CUUGGAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GAGGAGU	5323
2393	CUUGCUU G CAGACAA	1553	UUUGUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GAGGAGG	5324
2399	UCGAGAC G AAGUUCU	1554	GAGACUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GUUCGGA	5325
2412	UCUUAUC G CGUGUUG	1555	CSAGCGG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GAUUGAGA	5326
2415	CAUUGCC G CUUGGAG	1556	CUUGGAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GGCUAUUG	5327
2420	GCCGCUU G CAGAGAU	1557	AUUUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GACCGGC	5328
2514	GGUACUU G CUUUAUC	1558	GAUUAAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGUUAU	5329
2549	CUUUUUU G ACUUUAU	1559	AUGAUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AGAAAGG	5330
2560	AUUUUUU G CAGAGGA	1560	UCCUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAUAUUU	5331
2576	ACAUUUU G AUAGUUU	1561	ACAUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AACAUGU	5332
2615	CAGUAAU G AAACAGG	1562	CUUGUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AUUUAUU	5333
2641	UUUAUUU G CUUGUAG	1563	CUAGGAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AUAGUUA	5334
2645	CUUGUUU G CUAGUUU	1564	AAACUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGCUUAG	5335
2677	AAAUUUU G CCCCAGA	1565	UCUAGGG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAUAUUU	5336
2740	UUUUGAC G CGACUA	1566	UAUUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GUCUGAA	5337
2742	CAGAGCC G ACUUUUU	1567	AAUAUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GCUUCUG	5338
2804	CAGUAGU G CUUUUUU	1568	AAUUGAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GCUAGUG	5339
2814	CUUUUUU G CGGUUAC	1569	GUAGCCG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAUAUAG	5340
2875	CAACUCC G CACAGGA	1570	UUCUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GAGUUUG	5341
2928	CUUUUUU G AUUAUUG	1571	CUUUAUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GGGUAGA	5342
2946	UGAGUUU G CAUUAUA	1572	UUUUAUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGUUUA	5343
2990	CUUAGCC G CACAGGA	1573	UCCUUUG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GGUUUAG	5344
3012	GUUGGAC G CACAGAG	1574	CUUUUUG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GUCUGGC	5345
3090	GUUUUUU G CUUAGGC	1575	GUUUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG GUGAGGC	5346
3113	ACAUUUU G CACAGGC	1576	GUUUUUU GGGGAAACUCC CU UCAAGGACAUUCUCCGGG ACAGUUU	5347
3132	CUUUUUU G CUUAGC	1577	GUUGGAG GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AGGAGAG	5348
51	AGGCGUU G UCUUCC	1578	GGAAUUA GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AAGUCCU	5349
106	AGAAUUU G UCUUCC	1579	GGAGAGA GGGGAAACUCC CU UCAAGGACAUUCUCCGGG AGUUUUU	5350

Table 42

148	GUUCGUA	GGAGGAAACUCC	CU	UCAGGACAUUCGUCGG	AGGGUCC	5351
198	CUUCUUG	G UUAACGC		GCUUUAA	GGAGGAAACUCC	5352
219	UUUUUUU	G UUGGAAA		UUUUUCAA	GGAGGAAACUCC	5353
297	ACACCCUU	G UUUUUUG		CCAGACA	GGAGGAAACUCC	5354
299	ACCGGUGU	G UUUUGCC		GACCAAGA	GGAGGAAACUCC	5355
347	ACCAACCU	G UUGUUCU		GAGGACA	GGAGGAAACUCC	5356
350	ACCUUUU	G UUUUUUA		UUUGGGA	GGAGGAAACUCC	5357
362	ACCAUUU	G UUCUUUU		AAACNAGA	GGAGGAAACUCC	5358
381	CCUGGUAU	G UUCUUGC		GCAGACA	GGAGGAAACUCC	5359
383	CUAGAGU	G UUGUGGC		GGCGAGA	GGAGGAAACUCC	5360
438	AUUUUUU	G UUGUUUU		AGAACAA	GGAGGAAACUCC	5361
465	CAAGGUU	G UUGCCUU		ACGGCAA	GGAGGAAACUCC	5362
476	GCUCUUU	G UUCUUAA		UUAAGGA	GGAGGAAACUCC	5363
555	ACCUUUAU	G UUUCCUC		GAGGAAA	GGAGGAAACUCC	5364
566	UCCUUUU	G UUGUGUA		UACAGAA	GGAGGAAACUCC	5365
572	UUUUUUU	G UUGAAAC		GUUUUGA	GGAGGAAACUCC	5366
602	CUACUUU	G UUUUUUA		UUGGAUA	GGAGGAAACUCC	5367
694	UGCCAUUU	G UUCAGUG		CCACUGAA	GGAGGAAACUCC	5368
724	CCCCACU	G UUCUGUU		AGCCAGA	GGAGGAAACUCC	5369
750	UGAUAUU	G UUGUUUG		CAAAACA	GGAGGAAACUCC	5370
771	CCAGUUU	G UUCACAU		AUUUUUA	GGAGGAAACUCC	5371
801	AUGCCUU	G UUAUUUA		AUUUUUA	GGAGGAAACUCC	5372
818	UUUUUUU	G UUUUUUG		CCAAAGA	GGAGGAAACUCC	5373
888	UGGUAUU	G UUAUUUG		CCCAUUA	GGAGGAAACUCC	5374
927	ACCAUUU	G UUGAAAA		UUUUUUA	GGAGGAAACUCC	5375
944	AUCAAUU	G UUUUUUG		CUAAAAA	GGAGGAAACUCC	5376
946	CAAAUUU	G UUUUUGA		UCCUAAA	GGAGGAAACUCC	5377
963	ACCUUUU	G UUAACGG		CUUUUA	GGAGGAAACUCC	5378
991	GAAGUUU	G UUAACAA		UUUUUUA	GGAGGAAACUCC	5379
1002	AACGAUU	G UUGUUUU		AAGACUA	GGAGGAAACUCC	5380
1039	CACGAUU	G UUGUAUU		AUAUCCA	GGAGGAAACUCC	5381
1137	ACAGUUU	G UUAACUU		AGGUUA	GGAGGAAACUCC	5382
1184	UCCAGUU	G UUUUGUA		UCCAAAA	GGAGGAAACUCC	5383
1251	GAACUUU	G UUGUUUU		AGGACA	GGAGGAAACUCC	5384

Table 42

1253	ACCUUUGU G UUCUUCU	1614	AGAGGAGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACAGAGGU	5385
1294	ACCOCUUGU G UUUGUCU	1615	GAGCAGAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGAGGCU	5386
1344	ACNAUCU G UUGUGUC	1616	GAGCAGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGAUAUGU	5387
1390	CGAGAGCU G UCUUGCCA	1617	UGGCAGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGCUCAGC	5388
1435	CGUCCUUU G UUAUCGAC	1618	GACGUAAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AAAGAGCG	5389
1508	CGCCUAUU G UACCGACC	1619	GGUGGUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AAUAGGCG	5390
1557	CCCGCCUU G UGCCUUUU	1620	AGAAAGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGACGGGG	5391
1581	CGGACCGU G UGCACUUC	1621	GGAGUGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGGUCFCG	5392
1694	UCAGCAAU G UCAACAC	1622	GUUCUGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUUCGUGA	5393
1719	CAAGAGU G UGUUAUA	1623	UAAAGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUCUUUG	5394
1721	AGACUGU G UGUUUUA	1624	AUUAACA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACHUUCU	5395
1723	GACUUGU G UUAUAAGA	1625	UCAUTAAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACHAGUC	5396
1772	AGGUUUU G UUCUAGA	1626	UCCUAGUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AAAGACU	5397
1785	AGGAGCU G UAAGCAUA	1627	UAUUCUUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACCUCU	5398
1801	AAAUUGU G DUUUCACC	1628	GUUGAACA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACCAUUU	5399
1803	AUUGUGU G UUCACCG	1629	CUUGUAAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACCCAAU	5400
1850	CAUCUAAU G UUCUAGUC	1630	GACUAGNA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUGAGAU	5401
1856	AUUGUAU G UCCUAGU	1631	CAGUAGGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUGAACU	5402
1864	GUUCUACU G UUCAGCC	1632	GGCUUGAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGUAGAC	5403
1881	UCAGAGU G UGCCUUG	1633	CNAGGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGCUUGA	5404
1939	GACUCU G UGAGAGUA	1634	UAUCUCCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGNAGUC	5405
2013	UCUCUCU G UAUUGGAG	1635	CCCGGUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGAGAGA	5406
2045	GGACAUU G UUCACUCC	1636	GAGUTGAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AAUUGUC	5407
2082	GUUAUCU G UGUUGGG	1637	CCGCAACA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGAUAGC	5408
2084	UAUUGUGU G UUGUGUGU	1638	CAUCCCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACGAAUA	5409
2167	UUCUUAU G UCAACUCC	1639	AACGUTGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUAGCUA	5410
2205	CAACUAU G UGUUUAU	1640	UGAAACCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AAUAUUG	5411
2222	CAUUCU G UGUUAUU	1641	AAUUAAGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGGAAUG	5412
2245	GAGAAAU G UCUUUGA	1642	UUCAGAAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGUUUCU	5413
2262	UAUUUGU G UCUUUUG	1643	CCAAAGA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACCAAUA	5414
2274	UGUUGAGU G UGUUAUG	1644	CGAAUCCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG ACUCGAA	5415
2344	AAACUAU G UGUUAGA	1645	UCUAGCA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AGUAUUU	5416
2347	CUUCUUU G UUAAGGA	1646	UUCGUAAA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AACGUAU	5417
2450	CAUCUAU G UUGUAUU	1647	AAUACUA GGAGGAAACUCC CU UCAGAGACAUUCUCCGG AUUGAGU	5418

Table 42

2573	AGGAAU G UUGAUA	1648	UCUAUUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AAUUGCU	5419
2583	UGUUAU G UAGGAAU	1649	AUUGCUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AAUUAUA	5420
2594	AGCAUUU G UGGGGCC	1650	GGGCCCC GAGGAAAUCC CU UCAAGNCAUUGUCGGG AAUUAUA	5421
2663	AUCCAAU G UUAUAAA	1651	UUUAUUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AUUGGAAU	5422
2717	GAGUAU G UAGUAUU	1652	AUUAUAU GAGGAAAUCC CU UCAAGNCAUUGUCGGG AUUAUUG	5423
2901	AUUUUU G UCCCGAA	1653	AUUGGGA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AGAAAGU	5424
3071	GGGGACU G UUGGGUG	1654	CACCCCA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AGUCCCC	5425
3111	UGNACAU G UCCACGA	1655	UUCUGGA GAGGAAAUCC CU UCAAGNCAUUGUCGGG AGUUUGA	5426
40	AUCCAGA G UCAAGACC	1656	GGCCUGA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UUGGGAU	5427
46	GAGUAG G CCCUUN	1657	GUACGGG GAGGAAAUCC CU UCAAGNCAUUGUCGGG CUUACUC	5428
65	UCCUGUG G UGGUCUA	1658	UGAGCCA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CAGNCGA	5429
68	UGUGUG G CUCGAGU	1659	AAUGGAG GAGGAAAUCC CU UCAAGNCAUUGUCGGG CACNCGA	5430
74	UGGCUCA G UUCAGAA	1660	UUCUGAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UGAGCCA	5431
85	CAGGACA G UAGCCCU	1661	AGGCUCA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UBUUCUG	5432
89	ACAGUA G UCCUGUC	1662	GAGCAGG GAGGAAAUCC CU UCAAGNCAUUGUCGGG UUAUUGU	5433
120	GCCAUU G UCAAUUU	1663	AGAUUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GAUUGGC	5434
196	CCUGUC G UGUUAUG	1664	CUUAACA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GAGNCGG	5435
205	UUUACAG G CGGGAUU	1665	AAUCCCG GAGGAAAUCC CU UCAAGNCAUUGUCGGG CUUUAACA	5436
210	CAGCGGG G UUUUUUU	1666	AGABAAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CCGGCUU	5437
248	ACACAGA G UCUAGAU	1667	AGUUAUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UCUUGGU	5438
258	CUAGACU G UGGUGAC	1668	GUUACCA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GAGUUGU	5439
261	GAUCUGU G UGUAUUC	1669	GAUUGCA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CACGAGU	5440
295	GAACACC G UGUUUUU	1670	AGAGACA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GGGUUGU	5441
305	GUUUGUG G CAAAUUU	1671	AAUUUGG GAGGAAAUCC CU UCAAGNCAUUGUCGGG CAGAGAC	5442
318	AUUGCA G UCCAAUU	1672	AUUUGGA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UGCGAAU	5443
332	AUUUCCA G UCAUUAU	1673	GUUAGUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG UGAGAAU	5444
368	UUUUGUG G UUUUGUU	1674	AGCAUAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CAGAGAA	5445
380	UUUUGUG G CUUUUUU	1675	AUAUAUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CCGAGAA	5446
392	UCUGGCG G UUUUUUA	1676	UGUAUAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GCGGAGA	5447
442	UUUUGUG G UUUUGUG	1677	CAGAAUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CAACAGA	5448
461	CUUACAG G UUUUGUC	1678	GCACUUA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CUUUAUG	5449
472	UUUUGUG G UUUUUUU	1679	AGCAAAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG GGGGACA	5450
506	ACACACA G CACCGAC	1680	GUCCGUG GAGGAAAUCC CU UCAAGNCAUUGUCGGG UGUUUUU	5451
625	CAUUCUG G CUUUGCA	1681	UUCGAAA GAGGAAAUCC CU UCAAGNCAUUGUCGGG CCAAGUG	5452

Table 42

649	CUAUGGA G UUGGCUU	1682	GAGGCCA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UCCCUAG	5453
652	GGAGUGG G CUCACUG	1683	GACUGAG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCUCUCC	5454
658	GGGCUCA G UCCUUIU	1684	GAACGGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UGAGGCC	5455
662	CUAGUCC G UUCUCUU	1685	AAGAGAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG GGAGUGG	5456
672	UUUCUUG G CUCAGUU	1686	AACUCUG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CAAGAGAA	5457
677	UUGGCUA G UUUCUAG	1687	CUAGUAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UGAUCCAA	5458
685	GUUUAUA G UGCUAUU	1688	AUAUGCA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UAGUAAAC	5459
699	UUUCUUA G UGUUCUG	1689	ACGAACCA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UTAACAAA	5460
702	UUUCUUG G UGUUAGG	1690	CUUCGAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CACUGAAC	5461
706	AGUGUUC G UAGGCUU	1691	AAGCCUA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG GAACCAU	5462
711	UUUCUAG G CUUUCUCC	1692	GGGGAAG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCUUCGAA	5463
729	ACUGUCU G CUUUCAGU	1693	ACUGAAG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CAGACAGU	5464
736	GGCUUUA G UUAUUGG	1694	CCAUAAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UGAAAGCC	5465
753	AUGAUGG G UUUGGGG	1695	CCGCAAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CACAUCAU	5466
762	UUUGGGG G CCAAGUCU	1696	AGCUTGG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCACAAA	5467
767	GGGGCCA G UCUUAUA	1697	UUGUAGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UUGCCUCC	5468
785	GAUCUUA G UCCUUIA	1698	UAAAGGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UCAAGAG	5469
826	GUUCUUG G UUAUACUU	1699	AUGUAUA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCAAGAC	5470
888	AUUUGGA G UUGGGCA	1700	UGCCCAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UCCCAU	5471
904	GAGUGGG G CACAUUC	1701	GCNUUG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCAACUC	5472
971	GUAAACG G CCUAUUGA	1702	UCNAUG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CUGUUAC	5473
987	AUUGGAA G UAUUCUA	1703	UUGAUA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UUUCUAA	5474
1006	AUUGUGG G UCUUUGG	1704	CCAAAGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCACAU	5475
1016	CUUUGG G UUUGGCC	1705	GGCGAAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CCAAAAG	5476
1080	GAUACAG G CAAACAG	1706	CUUUUUG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UUGUAUG	5477
1089	CAAAACG G CUUUUACU	1707	AGUAAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CUGUUUG	5478
1116	CUUACAG G CUUUUUA	1708	UAGAAAG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CUUUAAG	5479
1126	CUUUAUA G UAAACUGU	1709	ACUUAUA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UUAUAG	5480
1133	GUUUAUA G UUUAUGA	1710	UUCUAUA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UGUUUAC	5481
1150	UUUACCC G UUGUCUGG	1711	CCGACAA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG GGGUAAA	5482
1162	GUUGUUG G CAAAGGCC	1712	GGCGUUG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CGAGAAC	5483
1166	CGGACAG G CUGUGUCU	1713	AGACGAG GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CUGUCCG	5484
1171	AGGCCUG G UCUAUGCC	1714	GGUAAGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG CAGGCCU	5485
1182	UAUGCCA G UUUUGUCU	1715	AGCAAGA GGAGGAAACUCC CU UCAAGGACAUUCUICCGG UUGCAUA	5486

Table 42

1207	CCCCAUG G UUGAGGU	1716	AGCCCCAA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CAGUGGG	5487
1213	UGGUUUG G CUGAGCCA	1717	UGUCCAA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CAGUGGG	5488
1218	GGGUUG G CUAAGGC	1718	GCUAUUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CAGUGGG	5489
1225	GGCAUUG G CUAUAGC	1719	GCUAUUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUAUGGCC	5490
1232	GGCCAUG G CGCAUGG	1720	CGCAUUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG UGAUGGCC	5491
1240	GGCNUGC G UGNAACU	1721	AGGUUCCA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GCNUGCC	5492
1287	AAUCCUA G CGCUUGU	1722	ACNAGCG GAGGAAACUCC CU UCNAGGACNUCUGCCGG UAGGAGU	5493
1306	UGUCCUA G CAGUGUG	1723	CAGACUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG UAGGAGU	5494
1310	CGCAGAG G UUGGGAC	1724	GGCCCAAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUGUCUG	5495
1317	GGUUGUG G CAAACUC	1725	GAGUUUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CCAAGAC	5496
1347	AUUUUG G UGUUCCU	1726	GAGAUCA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GACGAAU	5497
1379	UUUCCAU G CUGGUAG	1727	CUAGCAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CAUGAAA	5498
1387	GCUGUAG G CUGUGUG	1728	CAGCAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUAAGAC	5499
1418	CGCGGAC G UCCUUUG	1729	ACNAGGA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GUCCCGG	5500
1431	UUUUUAC G UCCGUGG	1730	CGAUGGA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GUAAACA	5501
1436	UAGUCCC G UCGGCGU	1731	AGUCCGA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GGAACUA	5502
1440	UCCGUGG G CGCUAAU	1732	AUUCAGG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CGACGGA	5503
1471	CUCCGAG G CGCUUGG	1733	ACNAGCG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CCGCGAG	5504
1481	CGUUGGG G CUCUACG	1734	CGUUGAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CCAAGCG	5505
1517	UAGGACC G UCUAGGG	1735	CCGUAGA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GGUUGUA	5506
1526	UCCAGGG G CGCAACU	1736	GAGUUGG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CCGUGGA	5507
1553	GACUCCC G UGUUGCC	1737	GGCACAA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GAGGAGU	5508
1579	GCCGGAC G UGUUGACU	1738	AGUACAA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GGUCCGGC	5509
1605	CUGGCAC G UGGUUGG	1739	CAUUGCA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GUGCAGG	5510
1622	AGGCCAC G UGAACUGU	1740	AGGUUUA GAGGAAACUCC CU UCNAGGACNUCUGCCGG GUGUGGU	5511
1649	UGCCGAG G UGUUGCU	1741	AUGCAGA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUGUGGA	5512
1679	GACUUGA G CAUUGUA	1742	UGACUUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG UGAAGUC	5513
1703	ACUUGAG G CUGUGUC	1743	GAGUAUG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUAAGUU	5514
1732	UUUAAGA G UGGAGGA	1744	UCCUCCA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUUUAUA	5515
1741	UGGAGGA G UUGGGGGA	1745	UCCCCAA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUUCCCA	5516
1754	GGGAGAG G UUAUGUA	1746	UAACCUA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUCCUCC	5517
1759	GAGUUG G UUAAGUU	1747	ACCUUUA GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUUACUC	5518
1762	GUUUAAG G CUGUUGA	1748	UACAAAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUUUAAC	5519
1786	AGCAGAG G CUGUAGC	1749	GCUCAG GAGGAAACUCC CU UCNAGGACNUCUGCCGG CUCCUAG	5520

Table 42

1789	GGGUGAG G CUAUAU	1750	AUUUAUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUACAGCC	5521
1799	AUAUAUG G UGUUAU	1751	UAMACUA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUAUAU	5522
1811	GUUACCA G CACUAUCC	1752	GUUAUGG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UGUUAAC	5523
1870	GUUUCAA G CUUCGAG	1753	CUUGGAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UUGAGGC	5524
1878	GGUUCAA G CUGUGCU	1754	AGGACAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UUGAGGC	5525
1890	UCCUUGG G UGUUUU	1755	CAAUCCA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUAUGCA	5526
1893	CUUGGGG G CUUGGGG	1756	CCCAAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CACCAAG	5527
1901	GUUUUGG G UGUUGCA	1757	UGUCCAA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAAGG	5528
1917	AUUACCC G UUAUAGA	1758	UCUUUAU GGAGGAAACUCC CU UCAGGACAUUGUCUGGG GGUUAU	5529
1933	AUUUGA G CUUGUG	1759	CACAGAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UCUAAU	5530
1944	UUUGGA G UUAUUC	1760	GAGUAA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UCUAGA	5531
2031	AUCGGGG G CUUUGAG	1761	CUUAAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCCCAG	5532
2033	GGUUGA G UCUUGGA	1762	UCCGAGA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UCUAGGC	5533
2062	ACCUAG G CACUAGG	1763	CUUGAGG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CGUAUGU	5534
2070	GCUCAG G CACUAU	1764	AUACUUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUAGUCC	5535
2074	UCAGGGA G CUUUCUG	1765	CGAAUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UUGCUGA	5536
2090	GUUGGGG G UGUUGGA	1766	UUAUCCA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAAGC	5537
2094	UGGUGGA G UUGUAGA	1767	UUAUCCA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAAGC	5538
2107	UGAUUA G CCACUG	1768	CCAGUUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UAGAUCA	5539
2116	CCACUGG G UGGUAGU	1769	ACUCCCA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAAGUG	5540
2123	GUUGGGA G UUAUUGG	1770	CUAAUUA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UUCACCC	5541
2140	AAGAUCA G CAUCAGG	1771	CCUGAUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UGUUAU	5542
2155	GGUAUA G UAGUCAGC	1772	GUUGAUA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UUAUUC	5543
2158	AUAUGA G UGACUAU	1773	AUACUA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UACUAU	5544
2162	AGUGGA G CUAUUGA	1774	UGACUAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UGACUAU	5545
2173	AUUGCAG G UUAUUG	1775	CAUAUUA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG GUUGAU	5546
2183	AUAUUG G CUUAAAA	1776	UUUUUAG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAUAUA	5547
2208	CUUUGG G UUAUUAU	1777	AUGUAAA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CACUAU	5548
2235	ACUUGG G CAGAAAC	1778	GUUUCUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CCAAAAU	5549
2260	AUAUUG G UGUUUUU	1779	AAAAGA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CAAUAU	5550
2272	UUUUGA G UGUUGAU	1780	AUUCACA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG UCUAAG	5551
2360	ACGAAG G CAGUUC	1781	GGACUUG GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUUUGU	5552
2364	AGAGGAG G UCCUUG	1782	CUAGGGA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUUCCU	5553
2403	AGAGGAG G CUUUAUC	1783	GAUUGA GGAGGAAACUCC CU UCAGGACAUUGUCUGGG CUUCGU	5554

Table 42

2417	UUCGCG	G	UUCGCG	1784	UUCGCG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	GGCGAU	5555
2454	CAUUGUA	G	UAUUCU	1785	AAGUAU	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UACAUUG	5556
2474	CAUUAU	G	UGGAAAC	1786	GUUCCCA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUUAUUG	5557
2491	UUACCGG	G	UUUAUUC	1787	GAUAUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CCGUAAA	5558
2507	CUUCUAG	G	UACUUAU	1788	GCAUAUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CGUAGAAG	5559
2520	CGUAUUG	G	CAACUCC	1789	GGUUAUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CAUUAAG	5560
2587	AGUAUUA	G	CAUUAUG	1790	ACAAUUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUAUUCU	5561
2599	UUUGUGG	G	CCCUUAC	1791	GUAGGGG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CCCAAAA	5562
2609	CCUUAUA	G	UAAUAUA	1792	UUUAUUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UGUAAGG	5563
2650	CCUUAUA	G	UUUAUUC	1793	GGUAUUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUAGCAG	5564
2701	AUCBAAC	G	UUUAUUC	1794	GAUUAUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	GGUUAUG	5565
2713	UAUCCAG	G	UUUAUUG	1795	ACUUAUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUCUGUA	5566
2720	AGUAUUA	G	UUUAUUA	1796	AUUAUUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UACUAUUA	5567
2768	UUUGAAG	G	CGGGUAU	1797	GAUCCCG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUUCCAAA	5568
2791	AAAGAGA	G	UUCACAG	1798	CGUUGGA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUCUUAU	5569
2799	GUCCACG	G	UUGGCGU	1799	AGGCGUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	GGUUGAC	5570
2802	CAACUGA	G	CGCCUAU	1800	AUGAGCG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUGUUGU	5571
2818	UUUUGUG	G	UACCUUA	1801	UAUUGUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CCGCAAAA	5572
2848	GAUCUUA	G	CAUGGAG	1802	CUCCUUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UGUAUUC	5573
2857	CAUGGAG	G	UUGGUUA	1803	AAACCAA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUCCUUG	5574
2861	GGGUGUG	G	UUUUCUA	1804	UUUGAGA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CAACUUG	5575
2881	UGUAUAG	G	CAUGGGA	1805	UCCCUUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUUUGCA	5576
2936	GAUCAUA	G	UUGGACC	1806	GGUCCAA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUAUGAU	5577
2955	CAUUAUA	G	CAUUAUA	1807	UGAUUGG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UUUGAUG	5578
2964	CAUUAUA	G	UUGGACG	1808	UGUAUUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UGAUUGG	5579
3005	GAUAUUG	G	CGGAGCG	1809	GGUCCUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CAGUUGU	5580
3021	CAUUAUA	G	UGGAGUA	1810	CACUCCA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUUUUUG	5581
3027	AGUUGGA	G	UGGAGUA	1811	UGUCCUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UCCCAUUG	5582
3033	GAUUGGA	G	CAUUCGG	1812	CCGUAUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UCCCAUUC	5583
3041	CAUUAUG	G	CGAGGUG	1813	AACCUUG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CGUAUUG	5584
3047	GGGCGAG	G	UUUACUCC	1814	AGGUGUA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CUUGGCGC	5585
3077	CUUUGUG	G	UGGAGCC	1815	GGGUCCA	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CCCAACAG	5586
3082	GGGUGAG	G	CGUACAG	1816	CUAGGGG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	UCCAGCC	5587
3097	CGUUGAG	G	CCUACUA	1817	UGAUUAG	GGAGAAACUCC	CU	UCAGGACAUUCGUCGG	CCUAGCG	5588

Table 42

3117	UCGUGCA G CAGUCUCU	1818	AGGAGCUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGCACAG	5589
3120	UGCGAGCA G CTCUCUCU	1819	AGAGGAG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGCUGGA	5590
3146	ACCAUUG G CAGUCAGG	1820	CCUGACUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG CGAUUGU	5591
3149	UAUUGCA G AGUCAGAG	1821	CUUCUCUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGCUGAU	5592
3158	UAGUGAG G CAGUCUAC	1822	GUAGGUCU GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUUCUGA	5593
3161	GGAGGCA G CUCUACUC	1823	GGAGUAG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGCCUCC	5594
3204	UUCUCUAA G AUCCGACG	1824	CUGCAUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUGAGAU	5595
31	CUUCUAA G AUCCGAG	2196	UCUGGAGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UUGAGAG	5596
38	AGAUCCA G AGUCAGGG	2197	CCUUGACU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGGAUUC	5597
44	CAGAUCA G GGCCUGU	2198	ACUGGACC GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGACUUG	5598
45	AGAGUCAG G GCCUGUA	2199	UACAGCC GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUGACUCU	5599
64	UUCUCUGU G GUGGUCUC	2200	GGAGCAC GGAGGAAACUCC CU UCAGGACAUUCUCUGG AGCAGAA	5600
67	CTUCUGU G GUCUCAGU	2201	ACUGGAC GGAGGAAACUCC CU UCAGGACAUUCUCUGG ACCAGAG	5601
79	CCAUGUCA G GAACAGUG	2202	CACUGUUC GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGACUGG	5602
80	CAGUUCAG G ACAGUGA	2203	UCACUGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUGACUG	5603
99	CCUGUCA G AAUACUGU	2204	ACAGUUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGAGGAG	5604
135	UAUUGAA G ACUGGGGA	2205	UCCCCAGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UUCGAUA	5605
139	CUAAGAU G GGGACUCU	2206	AGGUCUCC GGAGGAAACUCC CU UCAGGACAUUCUCUGG AGUCUUG	5606
140	GAAGUCUG G GAGCCUG	2207	CAGGUCUC GGAGGAAACUCC CU UCAGGACAUUCUCUGG CAGUCUUC	5607
141	AGACUGG G GACCCUGU	2208	ACAGGUC GGAGGAAACUCC CU UCAGGACAUUCUCUGG CCGACUCU	5608
142	AGACUGG G ACCUGUA	2209	UACAGGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG CCGACUCU	5609
159	CCGAACAU G GAGAACAU	2210	AUGUUCU GGAGGAAACUCC CU UCAGGACAUUCUCUGG AUGUUCG	5610
160	CGAACAU G AGACAU	2211	GAUUCU GGAGGAAACUCC CU UCAGGACAUUCUCUGG CAUGUUG	5611
162	AAACUGA G AACUCC	2212	CGAUGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UCAUGU	5612
175	UCGACUA G ACUCUCA	2213	UAGGAGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGAUGGA	5613
176	CGAUCAG G ACUCUAG	2214	CUAGAGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUGAUGG	5614
184	GAUCUCA G GAGCCUG	2215	CAGGUCU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UAGGAGU	5615
185	ACUUCUAG G ACCUCUG	2216	CGAGGUG GGAGGAAACUCC CU UCAGGACAUUCUCUGG CUGAGU	5616
204	GUUUAUA G CGGGUGU	2217	ACCCCGG GGAGGAAACUCC CU UCAGGACAUUCUCUGG UGUAACU	5617
207	UAACAGG G GGGUUGU	2218	AAACCCG GGAGGAAACUCC CU UCAGGACAUUCUCUGG GTCUGUA	5618
208	UAACAGG G GGUUUUC	2219	GAUAACG GGAGGAAACUCC CU UCAGGACAUUCUCUGG CGUCUGA	5619
209	ACAGGCG G GUUUUCU	2220	AGAAACG GGAGGAAACUCC CU UCAGGACAUUCUCUGG CGGCUUG	5620
246	AUAACUA G ACUCUGA	2221	UUAAGAU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UUGGUUU	5621
253	AGAGUUA G ACUCUGG	2222	CCACGAGU GGAGGAAACUCC CU UCAGGACAUUCUCUGG UAGACU	5622

Table 42

260	AGATCCG G GCGGACU	2223	AAUCCAC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACAGUAG	5623
263	CUCUGGU G GACUUCU	2224	AGAAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACACAGG	5624
264	UCUGUGG G ACUUCUC	2225	AGAAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACACAGG	5625
283	AUUUUCG G GGGGAAC	2226	UGUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UAGAAAU	5626
284	AUUUUCG G GGGGAAC	2227	GUUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUAGAAA	5627
285	UUUCUAG G GGAACAC	2228	GGUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUAGAAA	5628
286	UUUCUAG G GGAACAC	2229	GGUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUAGAAA	5629
287	UUUCUAG G GGAACAC	2230	CGGUGUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CCCCAGA	5630
304	UGUGUCU G GCGAAAU	2231	AUUUUGGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AAGACAC	5631
367	UUUGUCU G GUUATGC	2232	GGAAUAC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AGACAAA	5632
377	UUUGUCU G GAUGUUC	2233	GACAAUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AGGAAUA	5633
378	UUUGUCU G AUUGUUC	2234	AGACAAU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAGGAAU	5634
389	GUUGUCG G GGUUUUA	2235	UAAACGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GCAACAC	5635
441	UUUUCU G GUUUCUC	2236	AGAAUAC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AACAGAA	5636
450	GUUUCU G GACUUA	2237	UGAAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AGAAGAC	5637
451	UUUUCU G ACUUA	2238	UUUAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAGAGAA	5638
460	ACTAUCA G GUUGUG	2239	CACAAUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUGAAU	5639
490	UAAUCCA G GAUUA	2240	UGAAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGGAUUA	5640
491	AUUCUAG G AUCAUA	2241	UUUAUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUAGAUA	5641
511	CAGACCC G GACCAUC	2242	GUUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GUGUCUG	5642
512	CAGACCG G ACCAUA	2243	UUCAUUG GGAGGAAUCC CU UCAAGGACAUUCUCCGG CGUGUCG	5643
514	UGUCUAA G GAUUCU	2244	AGAGUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUGAGAG	5644
545	UGUCUAG G AACUUA	2245	UAGAGUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUUAGCA	5645
585	AAACUAC G GACGAAA	2246	UUUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GUAGUUU	5646
586	AACUACG G GCGGAAAC	2247	GUUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CGUAGUU	5647
589	CUAGGAC G GAUUCUC	2248	GCAGUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GUUCUAG	5648
590	CUAGGAC G AAUUA	2249	UUCAGUU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUUUCUA	5649
623	AUACUUG G GCUUUC	2250	CUAAGUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AAGAUAU	5650
624	UACUUCG G GCUUUC	2251	CGAAGUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAAAGUA	5651
644	AUACUUG G GAGUUGG	2252	CCUUCUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG AUAGUUU	5652
645	UACUUCG G GAGUUGG	2253	GCCACUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAUAGUA	5653
646	ACUUAUG G AUUGGCC	2254	GGCCUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CCUAGUU	5654
650	AUGGAGU G GCUUUC	2255	CUAGGCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACUCCUU	5655
651	UUGGAGU G GCUUUC	2256	ACUAGGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CACUCCA	5656

Table 42

671	UGUUCUUU G GCUUAGUU	2257	AACUAGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	ARGAGAA	5657
701	UGUUCAGU G GUUCUAG	2258	CUAGAAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	ACUGACA	5658
709	GUUCUGU G GGUUUCC	2259	GGAAAGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UACGAGC	5659
710	GUUCUGU G GGUUUCC	2260	GGAAAGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CUAGCAAC	5660
728	CACUCU G GCUUACAG	2261	CUGAAGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AGACAGU	5661
743	AGUUAUU G GAUGUUG	2262	ACUUCUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AUAUAUU	5662
744	GUUAUUU G AUGUUGU	2263	CACUAUU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CUAUAUC	5663
752	GAUAGU G GUUUUGG	2264	CCCAAAAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	ACUAUAC	5664
758	UGUUGUU G GAGGCCAA	2265	UUGGCCCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AAACACC	5665
759	UGUUGUU G GGGCCAG	2266	CUUGGCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAAAACA	5666
760	GUUUUGG G GGCRAAG	2267	ACUUGGCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCAAAAC	5667
761	GUUUUGG G GCCAAGUC	2268	GACUUGGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCCAAAC	5668
824	UGUUCUU G GUUAUACA	2269	UGUAUAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AAAGACA	5669
825	UGUUCUU G GUUAUACU	2270	AUGUAUAC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAAGACA	5670
856	AACAAAA G AUGUGU	2271	AUCCCAU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UUUUUUU	5671
859	AAAGAUA G GGUUAUU	2272	AUAUUCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UUUUUUU	5672
860	AAAGAUG G GGAUAUUC	2273	GAUAUCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAUUTUU	5673
861	AAAGAUG G GAUAUUC	2274	GAUAUUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCAUUTU	5674
862	AGAUGGG G AUABUCC	2275	GGRAUAU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCCAUUC	5675
881	ACUUCU G GGAUAUU	2276	ACUAUCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AUGAGUU	5676
882	ACUUCU G GAUAUGA	2277	UACAUAU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAUGAAGU	5677
883	CUUACUG G AUAGUAA	2278	UUAUAUU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCAUAGG	5678
894	AUGUAUU G GGAGUUG	2279	CCACUCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AUAUAUU	5679
895	UGUAUUG G GAGUUGG	2280	CCCAUUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAUAUACA	5680
896	GUUAUUG G AGUUGGG	2281	CCCAUAU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCAUUAU	5681
901	UGGAGUU G GGCACAU	2282	AUGUCCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AAUUCUCA	5682
902	GGAGUUG G GGCACAU	2283	AUUGUCC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CAACUCC	5683
903	GGAGUUG G GACAUUG	2284	CAAUUGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CCACUCC	5684
917	UUGCACA G GAUAUUU	2285	AUUGUUC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UGUGGCA	5685
918	UGCCACG G AACAUUU	2286	AAUAUUU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CUUGGCA	5686
952	GUUUUUA G GAUAUUC	2287	GAUUTUU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UUAACAC	5687
953	UGUUUAG G AAACUCC	2288	GGAGUUU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	CUAUAACA	5688
970	UGUAUUA G GCUUAUU	2289	CAUAUGC GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	UGUUUACA	5689
982	UAUUAUU G GAUAUUA	2290	AUAUUCU GGAGGAAACUCC CU UCAAGGACAUUCGUCGGG	AUAUAUA	5690

Table 42

963	AUIGAUUG G AAAGUAUG	2291	CAUACUUG GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAUCUAU	5691
1004	GAUAUGU G GUCUUDUG	2292	AAAGACC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	ACAUAUG	5692
1005	GAUAUGU G GUCUUDUG	2293	CAAAAGAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAUAUUG	5693
1013	GUUCUUUG G GGGUUGGC	2294	GCAAAACC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AAAGACC	5694
1014	GUUCUUUG G GGUUUGCC	2295	GGCAAAAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAAAAGAC	5695
1015	UGGUUUG G GUUUGCG	2296	GAGCAAAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAAAAGA	5696
1041	CGGAUUGU G GAUAUUCU	2297	AGAAUAUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	ACAUDCG	5697
1042	GCAUUGU G GAUAUUCU	2298	CAAAUAU GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAUAUUG	5698
1086	GUAAACA G GCUUUAUC	2299	GUAAAGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	UGUUAUG	5699
1115	ACUUAACA G GCUUUCU	2300	AGAAAGGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	UGUUAUG	5700
1159	GUUUGUC G GCACUGGC	2301	GCGUUGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	GAACUAG	5701
1165	UGGGACAC G GCUUGGUC	2302	GACACAGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	GUUGCCGA	5702
1170	AAAGCCCU G GUCAUUGC	2303	GCAUAGAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AGGCCGU	5703
1206	CCCCACU G GUUGGGGC	2304	GCCCCAAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AGUGGCG	5704
1210	CACUGUUG G GGGUUGG	2305	CAGUCCC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AACCAUG	5705
1211	ACUGGUG G GGUUGGC	2306	GCCAGCC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAACCAUG	5706
1212	UGGUUGG G GCUUGGCC	2307	GCCAGAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAACCAUG	5707
1217	UGGGGCU G GCAUAAG	2308	CCUAUGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AAAGCCCA	5708
1224	UGGCCAUA G GCCAUGG	2309	CUAUGGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	UAUGGCCA	5709
1242	GAUGGUG G GAACUUU	2310	AAAGGUUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	ACCAUUG	5710
1243	AGUGGUG G AACUUUG	2311	CAAAAGUU GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAACCAUG	5711
1277	CAUACCG G GAACUUU	2312	AGGAGUUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	GCGGUUUG	5712
1278	UAUACCG G AAUUCUA	2313	UAGAGUUU GAGGAAACUCC CU UCAAGGACAUUGUCGCG	GCGGUUUG	5713
1309	UGGACGA G GUUGGGG	2314	CCCCAGAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	UGUUGCA	5714
1314	GCUGGUCU G GGGCAAAA	2315	UUUUGCCC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AGACCUC	5715
1315	CAGUGUG G GGCACAAAC	2316	GUUUUGCC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAGACUUG	5716
1316	AGUUGUG G GCACAAAC	2317	AGUUUUGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CGAGACU	5717
1329	AACUUAUC G GCAUUGAC	2318	GUCAGUCC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	GAUGAGUU	5718
1330	ACUACUG G GAGUUGAC	2319	UGUUGUUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CGAUGAU	5719
1331	CUAUCGG G ACUGACAA	2320	UUUUGAGU GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CCGAUGAG	5720
1376	AUUUCCU G GCUUGUAG	2321	CUAGCAGC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AUGGAAU	5721
1386	GCGUUGA G GCGUUCU	2322	AGCAGAC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	UAGCAGCC	5722
1402	GGCACUUG G AUUUCUAC	2323	GUAGGAUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	AGUUGCCA	5723
1403	UGCCACUG G GAUCCUAG	2324	GUAGGAUC GAGGAAACUCC CU UCAAGGACAUUGUCGCG	CAGUUGCC	5724

Table 42

1413	UCUUAAGC G GAGAGUCC	2325	GGAGUUCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GGUAGAGA	5725
1414	CUUAGCG G GACUUCU	2326	AGUAGUUC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGUAGG	5726
1415	CUAGCGG G AGUUCU	2327	AAAGACU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGUAGG	5727
1439	GUUCCGCG G GCGUAG	2328	UUUAGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GACGAGAC	5728
1454	AUUCUCCG G GACGACC	2329	GGUUCGCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG GGUAGU	5729
1455	AUCCGCG G AGAGACC	2330	GGGUUCU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGCGAU	5730
1468	CCUUCUCC G GGGCGGU	2331	AGCGGCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG GGUAGGG	5731
1469	CUUCCUCC G GCGCGGU	2332	AAGCGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGGAGGG	5732
1470	CUUCCUCC G GCGCGGU	2333	UAAGCGG GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGGAGG	5733
1478	GGUCCGUU G GGGUUA	2334	UAGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAGCGCC	5734
1479	CGCGUUG G GGUUAC	2335	GUAGCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CAAAGCGC	5735
1480	CGUUCUG G GCUUAC	2336	GUAGAGC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CAAAGCG	5736
1523	CGUCCAC G GGGCGAC	2337	GUUCCUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG GUGGAGG	5737
1524	CGUCCAG G GGGCGAC	2338	GGUCCUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUAGAG	5738
1525	GUUCCAG G GCGUACU	2339	AGGUCCG GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCUUGAC	5739
1544	CUUUAAGC G GACUCC	2340	GGGUGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGUAGG	5740
1545	UUUAGCG G ACUCCCG	2341	CGCGGAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGUAAA	5741
1574	CAUUCUCC G GACUCCU	2342	ACAUGUUC UGAGAAACUCC CU UCAAGGACAUUCUCCGG GCGAGUAG	5742
1575	AUUCUCC G ACCGUUG	2343	CACAGGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CCGCGAU	5743
1612	GUUGCAU G GAGACAC	2344	GUUGUUC GAGGAAACUCC CU UCAAGGACAUUCUCCGG AUUCGAG	5744
1613	GUUGAUG G AGACAC	2345	GUUGUUC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CAUGGAC	5745
1615	GCUAUGA G ACCACCG	2346	ACGUGGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUUUGC	5746
1635	GUCCACA G GAACUCC	2347	UGAGUUC GAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUUGGCG	5747
1636	GUCCACAG G AACUCC	2348	GUUAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUUGGC	5748
1648	GUCCUCA G GGUUGCA	2349	UUUAGAC GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUGGGAG	5749
1660	UUGCAUA G AGUACU	2350	AGUGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUGAA	5750
1662	GUUAGGA G ACUUCU	2351	CACAGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG UCUUAGC	5751
1663	CAUAGAG G ACUUCU	2352	CUAAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CUUUAUG	5752
1670	GUACUUC G GACUUC	2353	UUAAGUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG AAGAGUCC	5753
1671	GUACUUG G ACUUCAG	2354	CUUAAAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG CAAAGUCC	5754
1702	CGACUUG G GCUUAC	2355	AAGUAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UCAAGUCC	5755
1715	ACUUCAA G ACUGUUG	2356	CACAGU GAGGAAACUCC CU UCAAGGACAUUCUCCGG UUUUAGU	5756
1734	UUAUAGU G GAGGAGU	2357	ACUCCUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG ACUUAUA	5757
1735	AUAGUCC G GAGGAGU	2358	AACUCCUCC GAGGAAACUCC CU UCAAGGACAUUCUCCGG CACUUAU	5758

Table 42

1736	UUGAGUG G AGGAGUG	2359	CAACUCU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CCACUCU	5759
1738	GAGUGGA G GAGUGGG	2360	CCAAACU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCCACUC	5760
1739	AGUGGGAG G AGUUGGG	2361	CCCAACU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCCACUC	5761
1744	GAGAGUU G GGGAGGA	2362	UCCUCCC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAUCUCU	5762
1745	AGAGUUG G GGGAGAG	2363	UCCUCCC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAUCUCU	5763
1746	GAGUUG G GGGAGAG	2364	CCUCCUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CCAAUUC	5764
1747	GAGUUGG G GGGAGGU	2365	ACUUCUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CCCAACUC	5765
1748	AGUUGGG G AGGAGGU	2366	AAUCUCU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CCCAACUC	5766
1750	UUGGGGA G GAGUUG	2367	CUAACUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCCCCAA	5767
1751	UGGGGAG G AGUUGAG	2368	CUAACUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCCCCCA	5768
1753	GGGGAGA G GUUAGUU	2369	AACTAAC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCCUCCC	5769
1758	GAGGUUA G GUUAAAG	2370	CCUUAAC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UAAUCUC	5770
1765	AGGUAAA G GUCUUUG	2371	ACAAAGAC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UUUAACUC	5771
1778	UUUACUA G GAGCUGU	2372	ACAGCUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UAGUAAA	5772
1779	UUGACUG G AGGCUUA	2373	UACAGCU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UAGUAAA	5773
1781	UACUAGA G GCUUAGG	2374	CCUACAG GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UUCUAGUA	5774
1788	AGGCUUA G GCAUAAU	2375	AUUUAUG GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UACAGCU	5775
1798	CAUAAU G GUUUGU	2376	GAACACG GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAUUAUG	5776
1888	UUUCUU G GUUGUU	2377	AAUCAGC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAAGACA	5777
1889	GUUCUUG G GUUCUU	2378	AAGCCAC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CAAGCNC	5778
1892	CCUUGGU G GCUUUGG	2379	CCAAAGC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AGCCNAG	5779
1898	GUUCUU G GGCUAUG	2380	CAUAGCC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAAGCCAC	5780
1899	UGGCUUG G GGCUAUG	2381	UCCAUUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAAGCCA	5781
1900	GGCUUG G GCAUGAC	2382	GUCAUUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CCAAAGC	5782
1905	UGGGGCU G GACAUUA	2383	UCAAUGC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AGGCCCA	5783
1906	GGGCGUG G ACAUUGC	2384	GUCAUUG GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CAUGCCC	5784
1924	GUUAAA G AAUUAUA	2385	UCCAAUU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UUUAUAG	5785
1930	ACAUAU G GCUUUA	2386	AGAGCUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AAAUUU	5786
1931	AGAAUUG G AGCUCUG	2387	AGAGCUC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CAAUUUU	5787
1941	GCUUCUG G GAGUUAU	2388	AGUAACU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	AGAGAGC	5788
1942	CUCUCUG G AGUUAUC	2389	GAGUAACU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CACAGAG	5789
1967	CUAUUGA G AUUCUUC	2390	GAGGAUU GAGGAAACUC	CU	UCAGGACACUCUCUCGG	UCGAAUAG	5790
2018	UCUUUAU G GGGGCUU	2391	AGGCCCC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	GAUACAG	5791
2019	CUUUAUG G GGGGCUU	2392	AGGCCCC GAGGAAACUC	CU	UCAGGACACUCUCUCGG	CGUAACAG	5792

Table 42

2020	UGAUUGG G GGGGCUUA	2393	UAAAGGCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CGGAUACA	5793
2021	GUUUGGG G GGCCUAG	2394	CUAAGCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CGGAUACA	5794
2022	UAUGGGG G GGCTUAGA	2395	UUAAGCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CGGAUACA	5795
2029	GGGCCUUA G AGUUCUG	2396	CGAGACU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG UAAAGGCC	5796
2037	GAGUCCG G GAACUUG	2397	CAUUGUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG GGAGACUC	5797
2038	AGUUCGG G ACAUUGU	2398	ACAUGUU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CGAGACU	5798
2061	CACACAC G GGAUCUAG	2399	CUAGUCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG GUAGUGG	5799
2069	GGCACUA G GCAAGCUA	2400	UAGUCUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG GUAGUCC	5800
2087	UCUGUGU G GGUUGAGU	2401	ACUACCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AACACAGA	5801
2088	CUUGUUG G GGUGAGUU	2402	AACUACC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAACACAG	5802
2089	UGUUGUG G GUGAGUUG	2403	CACUCAC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CCACACAA	5803
2114	AGCACCU G GUGUGGAA	2404	UUCACCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AGUGGCU	5804
2115	GGCACCU G GUGGGAAG	2405	UUCCACG GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAGUGUCC	5805
2118	ACUUGGU G GGAUUA	2406	UUAUCUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG ACCCAGGU	5806
2119	CUUGGUG G GAGUUAU	2407	AUAUCUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CACCAGG	5807
2120	CGUGGUG G AAGUAUU	2408	AUAUCUU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CCACCCAG	5808
2130	AGUAUUU G GAGAUCC	2409	GGUUCUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AAUAUACU	5809
2131	GUUAUUU G AAGAUCCA	2410	UGGAUCU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAUAUAC	5810
2134	AUUUGAA G AUCCACA	2411	UGUGUAU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG UUCCAAU	5811
2147	AGAUCCA G GGAUUGAG	2412	CUAAUCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG UGUAUCU	5812
2148	GGUCCAG G GAUAUAGU	2413	ACUAUUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CUGAUUC	5813
2149	CAUCCAG G AAUAUAGA	2414	UACUAUU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CUUGAUG	5814
2181	GUUAUUU G GGCUUAA	2415	UUUAGCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AUUAUAC	5815
2182	UUUAUUG G GCUUAAA	2416	UUUAGCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAUAUUA	5816
2195	AAUAUUA G ACUAUUAU	2417	UAUGUGU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG UGAUUUU	5817
2207	ACUAUUG G GUUUAACA	2418	UGUAUAC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG ACUAUUG	5818
2233	UUACUUU G GGCGAAA	2419	UUUCUCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AAAGUUA	5819
2234	UACUUUG G GCGAGAAA	2420	UUUCUCC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAAAGUA	5820
2239	UUUGGGA G AAACUUAU	2421	AAAGUUU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG UGCGCNA	5821
2259	GAUAUUU G GGUCUUU	2422	AAAGACAC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AAUAUUC	5822
2269	UUUCUUU G GAGUUGG	2423	CCACACUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG AAAGACA	5823
2270	GUUUUUG G AGUUGGA	2424	UCCACGU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CAAGAAC	5824
2276	UGAGUUG G GAUUGCCA	2425	UCCGAUC GGAGGAAACUCC CU UCAGGACAUUGUCCGGG ACACUCCA	5825
2277	GUUGGUG G AUUGGCAC	2426	GUUGGAU GGAGGAAACUCC CU UCAGGACAUUGUCCGGG CACACUCC	5826

Table 42

2300	ACACUUA G ACCACAA	2427	UUUUGGU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUUGCA	5827
2334	ACAUUCC G GAACUAC	2428	GUAGUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGAGUUG	5828
2335	CAUUCUG G AAACUAC	2429	AGUAGUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CGAGUUG	5829
2351	UUUUUUA G ACAGAGG	2430	CUUCUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUUGCA	5830
2357	UAGACAA G AGCAGAG	2431	ACUUGCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUCUGUA	5831
2359	GACGAGA G GCAGUCC	2432	GGACUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCUUUCU	5832
2363	UAGGACA G GUUCCUA	2433	UAGGGAC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UGCCUUC	5833
2372	GUUCCUA G AAGAAGAA	2434	UUUUCUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UAGGGAC	5834
2375	CCUUGAA G AGAAGU	2435	GAGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUUCUAGG	5835
2378	UAGAAGA G AACUCCU	2436	AGGAGUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUCUUAU	5836
2386	GCUCUGA G AGCAAGGU	2437	ACUUCUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCCGAGC	5837
2402	CGACGAA G GUUCUAAU	2438	AUUGAGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUUCUUG	5838
2423	GGUUGCA G AAGAUUC	2439	GAGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UGCAGCC	5839
2426	UCACAGA G AUUCUAAU	2440	AUUGAGU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUCUUGCA	5840
2438	UCAUUCC G GGUUUCU	2441	GAGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GGAUUGA	5841
2439	CAUUUCC G GAUUCUCA	2442	UGAGUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CGAGUUG	5842
2440	AUUCUUG G AAUCUAA	2443	UUAGAUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CCGAGUU	5843
2463	UAUUUCU G GACACUA	2444	UAUUGUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AAGAAUA	5844
2464	AUUCUUG G ACACUAA	2445	UUUUGUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CAGAGAU	5845
2473	ACACUAA G GUUGGAA	2446	UUUCCAC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUUGU	5846
2476	CUAAGGU G GGAAACUU	2447	AAGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUUUUG	5847
2477	AUAAGUG G GAAACUUU	2448	AAGUUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CACUUUA	5848
2478	UAAGUGG G AAACUUA	2449	UAAUUUU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CCACUUA	5849
2488	AAUUUAC G GGCUUUA	2450	UAAAGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GUAAUUU	5850
2489	ACUUUAC G GGCUUUA	2451	AUAAAGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUAAAU	5851
2490	CUUUUAC G GCUUUAU	2452	AUAAAGC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CCGUAAU	5852
2506	UCUUUAC G GUACUUU	2453	CAAGUAC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG GUAGAGA	5853
2529	UCCUAAU G GCAACUC	2454	GAGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG AUUUAUA	5854
2563	CAUUUGA G GAGACUU	2455	AUGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UGCAAAU	5855
2564	AUUUGAG G AGGACAU	2456	AUGUUCU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUCAAU	5856
2566	UUUCAGA G GACAUUGU	2457	ACAUUUC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UCCUUUA	5857
2567	UCCGAGG G ACUUUUGU	2458	AACUUUG GGAGGAAAUCC CU UCAAGGACAUUCUCCGG CUUCUGA	5858
2580	UUUUUUA G AUGUAAU	2459	GUUUUAU GGAGGAAAUCC CU UCAAGGACAUUCUCCGG UUAUCAA	5859
2596	CAUUUGU G GGCGCCU	2460	AGGGGCC GGAGGAAAUCC CU UCAAGGACAUUCUCCGG ACUAAUUG	5860

Table 42

2597	AUUIUG G GACCCU	2461	AAGGCG GGAGAAACUCC CU UCAGGACAUUCUCCGG CACAUAU	5861
2598	AUUIUG G GCCCUUA	2462	UAAGGCG GGAGAAACUCC CU UCAGGACAUUCUCCGG CACAUAU	5862
2599	UGAAACA G GAGACUUA	2463	UAAGUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UGUUUUA	5863
2623	GAACACAG G AGACUUA	2464	UAAGUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CUGUUUU	5864
2625	AAACACGA G ACUUAU	2465	AUUAAGU GGAGAAACUCC CU UCAGGACAUUCUCCGG UCUUUUU	5865
2649	GCUCUUA G GUUUUAU	2466	GAUAAC GGAGAAACUCC CU UCAGGACAUUCUCCGG UAGCAAC	5866
2684	UGCCUUA G GAUAAGG	2467	CCUUUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UAAGGCA	5867
2690	UGAUAA G GAUCAUA	2468	UUUAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUAUAUA	5868
2691	AGUAUAG G GAUUAAC	2469	GUUAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CUUAUUC	5869
2692	GAUAAG G AUCAAC	2470	GUUUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG CUUUUAU	5870
2711	AUAUUA G AGUAUA	2471	UACUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGAUAUA	5871
2737	UAUUUA G AGCGACA	2472	UGUCGU GGAGAAACUCC CU UCAGGACAUUCUCCGG UGUAUAU	5872
2763	CACUUU G GAAGCGG	2473	CGCCUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG AAAGUAU	5873
2764	ACUUUG G AAGCGGG	2474	CCGCCUU GGAGAAACUCC CU UCAGGACAUUCUCCGG CAAGAGU	5874
2767	CUUUGA G GCAGGUA	2475	AUCCGUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUCAAAG	5875
2770	UGAAAGC G GGAUAUC	2476	AGAUCU GGAGAAACUCC CU UCAGGACAUUCUCCGG GCUUUUA	5876
2771	GGAAGCG G GAUCUUA	2477	UAUAUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CGCUUUC	5877
2772	GGAAGCG G GAUCUUA	2478	AUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG CGGCUUC	5878
2773	AAGCGG G ACUUAUA	2479	UAUAUA GGAGAAACUCC CU UCAGGACAUUCUCCGG CCGCCUU	5879
2787	AUAUAA G AGUUAUA	2480	UGACUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUAUAU	5880
2789	AUAUAA G AGUUAUA	2481	UUUGUA GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUAUAU	5881
2816	CAUUUUC G GUUACCA	2482	UGUGUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG GCAAAUA	5882
2817	AUUUUG G GUUACCU	2483	AUGUUA GGAGAAACUCC CU UCAGGACAUUCUCCGG CGAAUAU	5883
2832	AUUUUC G GUAUAG	2484	CUUUAUC GGAGAAACUCC CU UCAGGACAUUCUCCGG AGAUAUA	5884
2833	UAUUUG G GAACAGA	2485	UCUUUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CAAGAUA	5885
2834	AUUUUG G AUAUAUA	2486	AUUUUUU GGAGAAACUCC CU UCAGGACAUUCUCCGG CCAAGAU	5886
2840	GGAGACA G AUUAUAG	2487	CUUAUAU GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUUUUU	5887
2852	UAUAUA G GAGUUUG	2488	CAACUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG AUGUUAU	5888
2853	ACAGUA G GAGUUUG	2489	CCACUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CAUGUUA	5889
2854	GCAUUGG G AGUUUGU	2490	ACCAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG CAGUUGU	5890
2856	GCAUUGG G GUUUGUA	2491	AGACUAC GGAGAAACUCC CU UCAGGACAUUCUCCGG UCCAUUC	5891
2860	GGAGUU G GUUUAUA	2492	UGGAAGC GGAGAAACUCC CU UCAGGACAUUCUCCGG AACUUCU	5892
2860	CUAGAA G GCAUUGG	2493	CCCAUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG UUUUAGU	5893
2885	AAGGUAU G GGAACAA	2494	UUUUUUC GGAGAAACUCC CU UCAGGACAUUCUCCGG AUGUUUU	5894

Table 42

2886	AAGCAUG G GACAAAU	2495	AUUGUCC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAUUCUU	5895
2887	AGCAUG G GACAAUC	2496	GAUUGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAUUCUU	5896
2888	GGCAUG G ACMAAUC	2497	AGAUUGU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUGC	5897
2915	AUUCUUU G GAUUGUU	2498	AAGAUUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AGGAGAU	5898
2916	AUUCUUU G GAUUGUU	2499	GAAGAUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAGGGAU	5899
2917	UCCCUUG G AUUCUUC	2500	GGAAGAU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAAGGA	5900
2939	CUCAUUU G GACCUUC	2501	GCAGGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AACUAUG	5901
2940	UAUUGU G AGCUCCA	2502	UUCAGGU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAAUGAU	5902
2973	UAAUCCA G AUUGGAGU	2503	GUCCAAU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG UGGAUUA	5903
2977	UCCAGUU G GAGUCCA	2504	UGAGUUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AUUCGGA	5904
2978	CAGUUG G GACUCAA	2505	UUGAGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAAUCUG	5905
2979	CAGUUG G ACUUCAC	2506	GUUGAGU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUG	5906
2996	CGCACAA G GACAAUC	2507	CAGUUCU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG UUGUGCG	5907
2997	CGCACAG G ACMAUCG	2508	CCAGUUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CUUGUCG	5908
3004	GACAAU G GCCGACG	2509	CUUCGCG GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AGUUGUC	5909
3008	ACUUGCC G GACGCCA	2510	UUGCGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG GACUAGU	5910
3009	ACUUGCC G AGCCAC	2511	GUUGGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CGGCCAG	5911
3020	GCACAA G GUGGAGU	2512	ACUCCAC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG UUGUUGC	5912
3023	ACAAGGU G GAGUGGG	2513	CCACUUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG ACUUGUU	5913
3024	ACAAGU G GAGUGGA	2514	UCCACUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CACUUGU	5914
3025	CAGGUG G AGUGGAG	2515	CUCCACU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUG	5915
3029	UGGAGU G GGAGCAU	2516	AUUGUCC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AGUCCAC	5916
3030	UGGAGUG G GAGCAUC	2517	GAUUGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CACUCCA	5917
3031	GGAGUG G AGCAUUG	2518	CGAUUCU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUC	5918
3039	GACAUUG G GCCCAUG	2519	CCUUGCC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG GAUUGUC	5919
3040	AGCAUUG G GCCAUGU	2520	ACCUUGC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUG	5920
3045	GGGCGCA G GUUACAC	2521	GUUGAAC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG UGAGCCGA	5921
3046	GGGCGCA G GUUACAC	2522	GGUUAAC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CUUGCCG	5922
3063	CUCCCAU G GGGAGUC	2523	CAGUCCC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AUGGGAG	5923
3064	UCCCAUG G GGGAGUC	2524	ACAGUCC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CAUGGGA	5924
3065	CCCAUG G GAGCAUUG	2525	AACAGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUGG	5925
3066	CCCAUG G GAGCAUUG	2526	CACAGUC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUGG	5926
3067	CACUUG G ACUUGUG	2527	CCACACU GGAGGAAAUCC CU UCAAGGACAUUGUCCGG CCAUUG	5927
3074	CGACUUG G GGGUGGAG	2528	CUCCACC GGAGGAAAUCC CU UCAAGGACAUUGUCCGG AACAGUC	5928

Table 42

3075	GAUCUUG G GUGGAGC	2529	GUUCACC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CAACAGUC	5929
3076	ACUGUUG G GUGGAGC	2530	GUUCACC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CACACAGU	5930
3079	UUGUGUG G GAGCCUUC	2531	GAGGCCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG ACCCACAAC	5931
3080	UUGUGUG G AGCCUCA	2532	UAGGGCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CACCCCA	5932
3095	CACGCUA G GGCUUACU	2533	AGUAGCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGAGGUG	5933
3096	AGCUPAG G GCCUACUC	2534	GAGUAGC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUGAGCUU	5934
3145	CACCAUIC G GCAGUCAG	2535	CUAGCUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG GAUUGGUG	5935
3153	GGAGUCA G GAAGCAG	2536	CUAGCUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGACUCC	5936
3154	GCAGUCAG G AAGCAGC	2537	GUAGCCU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUAGCUC	5937
3157	GUCAGAA G GCAGCUA	2538	UAGCUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUCUAGC	5938
3187	ACUCUAA G GCACUAC	2539	GAGUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UUGAGGU	5939
3188	CUUCUAG G GACACUA	2540	UAGUUC GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUUAGG	5940
3189	CUUAGG G ACACUACU	2541	AUGAGU GGAGGAAUCC CU UCAAGGACAUUCUCCGG CUUAGAG	5941
3203	CAUCUCA G GCCAUACA	2542	UGCAUCC GGAGGAAUCC CU UCAAGGACAUUCUCCGG UGAGGAG	5942

Input Sequence = AF100308. Cut Site = YG/M or UG/U.

Stem Length = 8. Core Sequence = GGAGGAAUCC CU UCAAGGACAUUCUCCGG

AF100308 (Hepatitis B virus strain 2-18, 3215 bp)

Table 43

Table 43: Human HBV Ribozyme and Target Sequence

Pos	Substrate	Seq ID	RP#	Ribozyme Alias	Ribozyme	Rz Seq ID
313	CCAAAU U CGCAGUC	5943	18157	HBV-313 Rz-7 RNA	GACUGCG CUGAUGAGCGCGUUAUGCGCGAA AUUUUGG B	6293
327	CCCAAAU C UCCAGUC	5944	18158	HBV-327 Rz-7 RNA	GACUGGA CUGAUGAGCGCGUUAUGCGCGAA AUUUUGG B	6294
334	CUCACGA C ACUACCC	5945	18159	HBV-334 Rz-7 RNA	GGUUGCA CUGAUGAGCGCGUUAUGCGCGAA AUUUUGG B	6295
408	UCUUCGU C UGCACCC	5946	18160	HBV-408 Rz-7 RNA	GGAUGCA CUGAUGAGCGCGUUAUGCGCGAA AGGAACA B	6296
557	UCUAUGU U UCCUCCA	5947	18161	HBV-557 Rz-7 RNA	UGAGGGA CUGAUGAGCGCGUUAUGCGCGAA ACAUACA B	6297
1255	UCUAUGU C UCCUCCU	5948	18162	HBV-1255 Rz-7 RNA	CAGAGGA CUGAUGAGCGCGUUAUGCGCGAA ACAACAA B	6298
1538	CCUCUCU U UACGCGG	5949	18163	HBV-1538 Rz-7 RNA	UUUAAGU CUGAUGAGCGCGUUAUGCGCGAA ACCUCU B	6299
1756	AGAGAGU U AGGUUUA	5950	18164	HBV-1756 Rz-7 RNA	UGAACAG CUGAUGAGCGCGUUAUGCGCGAA AGACAAU B	6301
1861	AGGAGGU C AUUUUUA	5951	18165	HBV-1861 Rz-7 RNA	GGUACAG CUGAUGAGCGCGUUAUGCGCGAA AGAAGAA B	6302
2504	UUUCUCU A CGGUUUA	5952	18166	HBV-2504 Rz-7 RNA	UGAAAGG CUGAUGAGCGCGUUAUGCGCGAA GGUUGAG B	6303
10	CUCACGA C AUUUUUA	5953	18197	HBV-10 CHZ-7 RNA	UGGUGGA CUGAUGAGCGCGUUAUGCGCGAA GAGACAC B	6304
335	UCGAGUC A CUCACCA	5954	18198	HBV-335 CHZ-7 RNA	CGGCAGA CUGAUGAGCGCGUUAUGCGCGAA GAGACAC B	6305
1258	GUUGUCU C UUCGCGG	5955	18199	HBV-1258 CHZ-7 RNA	GGGCAUU CUGAUGAGCGCGUUAUGCGCGAA GUUGUUC B	6306
2307	GACCAAC A AUUGCCGC	5956	18200	HBV-2307 CHZ-7 RNA	GACAA UGAUGGCAUGCGAUUGUGCGG AGAGUGUUG B	6307
347	CCACCAACU G UUCUC	5957	18216	HBV-347 GCL Rz-5/10 RNA	GACGA UGAUGGCAUGCGAUUGUGCGG AGAGUGUUG B	6308
350	CCACCAACU G UUCUC	5958	18217	HBV-350 GCL Rz-5/10 RNA	GACGA UGAUGGCAUGCGAUUGUGCGG AGAGUGUUG B	6309
1508	UCCGCUAAU U UACCG	5959	18218	HBV-1508 GCL Rz-5/10 RNA	CGGLUA UGAUGGCAUGCGAUUGUGCGG AAUAGCGCGA B	6310
234	AAUCCU C ACAUUA	5960	18334	HBV-234 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6311
252	GAGUCU A CAGUCG	5961	18335	HBV-252 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6312
268	UGGACU U CUCUUA	5962	18337	HBV-268 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6313
280	AAUUUU C UAGCGGU	5963	18345	HBV-280 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6314
313	CAAAAU U CGCAGU	5964	18346	HBV-313 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6315
395	GCGGUU U UAUCAU	5985	18350	HBV-395 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6316
402	UAUCAA C UCCUCC	5966	18351	HBV-402 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6317
607	UGUAUU C CCAUCC	5967	18355	HBV-607 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6318
697	UUUGUU C AGUGGU	5968	18362	HBV-697 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6319
1539	UCUCUU C UACGCGG	5969	18366	HBV-1539 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6320
1599	UCAGCU C UGCAGCG	5970	18367	HBV-1599 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6321
1607	GCACGU C GCAUUGG	5971	18368	HBV-1607 Rz-6 allyl stab1	U ₉ G ₉ U ₉ G ₉ U ₉ U ₉ dGUAUGagggcgagggcgGaa Agauca B	6322

Table 43

1833	UCACCUU C UGCGCUA	5972	18371	HBV-1833 Rz-6 allyl stab1	u ₈ s ₉ s ₉ s ₉ ac dUGAU ₈ GagcgcgcguuagccGaa Aguuqa B	6322
2383	AGAAUUC C CCUGGC	5973	18374	HBV-2383 Rz-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuc B	6323
2429	GAAGUUC C UCAUUC	5974	18376	HBV-2429 Rz-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Auuuc B	6324
2831	UAUUUUC U GGGAAc	5975	18379	HBV-2831 Rz-6 allyl stab1	g ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Agauaa B	6325
430	UGCCUUC A UCUUUC	5976	18391	HBV-430 CHZ-6 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lagccaa B	6326
676	UGGUUUC A GUUUAC	5977	18396	HBV-676 CHZ-6 allyl stab1	g ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lagccaa B	6327
883	GUUUUC U AGUGGC	5978	18397	HBV-683 CHZ-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa luuaaa B	6328
1150	UUUAUUC C CGUUGC	5979	18402	HBV-1150 CHZ-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6329
1200	CGAAUC C CCACUG	5980	18403	HBV-1200 CHZ-6 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6330
1201	CAACCC C CACUGG	5981	18404	HBV-1201 CHZ-6 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6331
1444	CGCGGC U GAUUC	5982	18405	HBV-1444 CHZ-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lgcgcgc B	6332
1451	GAUUUC C CGGGAC	5983	18406	HBV-1451 CHZ-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6333
1533	CGACUC C CUCUUC	5984	18407	HBV-1533 CHZ-6 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6334
1600	CGACUC U GCACGU	5985	18410	HBV-1600 CHZ-6 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6335
1698	CGACUC U UGAGCC	5986	18411	HBV-1698 CHZ-6 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lguuag B	6336
1784	GUAGGC U CUGUCG	5987	18412	HBV-1784 CHZ-6 allyl stab1	u ₈ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lcuuac B	6337
1829	UUUUUC A CCLUGG	5988	18414	HBV-1829 CHZ-6 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa laaaaa B	6338
1876	GCUCUC A AGUUGU	5989	18420	HBV-1876 CHZ-6 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lgcgcgc B	6339
1880	CCAAAGC U GUUGCA	5990	18422	HBV-1880 CHZ-6 allyl stab1	u ₈ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa lcuuag B	6340
218	UUUUUC U GUUGACA	5991	18333	HBV-218 Rz-7 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Agaaaaa B	6341
257	CUAGACU C GUGUGG	5992	18336	HBV-257 Rz-7 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuag B	6342
268	GUGGACU U CUCUCAA	5993	18338	HBV-268 Rz-7 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuac B	6343
269	UGAGACU U CUCUAAU	5994	18339	HBV-269 Rz-7 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuac B	6344
271	GACUUCU C UCAUUAU	5995	18340	HBV-271 Rz-7 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuac B	6345
273	CUUCUCU C AAUUUUC	5996	18341	HBV-273 Rz-7 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Aguuuag B	6346
277	UCUCAAU U UCUAGG	5997	18342	HBV-277 Rz-7 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Auuuuag B	6347
278	UCUCAAU U CUUAGG	5998	18343	HBV-278 Rz-7 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Auuuuag B	6348
279	UCAUUUU U CUAGGGG	5999	18344	HBV-279 Rz-7 allyl stab1	c ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Auuuuag B	6349
314	CAAAAUU C CGACUGG	6000	18347	HBV-314 Rz-7 allyl stab1	g ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Auuuuag B	6350
385	AGUGUGU C UUGCGGG	6001	18348	HBV-385 Rz-7 allyl stab1	q ₅ s ₅ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Acauuuag B	6351
394	CGCGCGU U UUAUCAU	6002	18349	HBV-394 Rz-7 allyl stab1	a ₉ s ₉ s ₉ s ₉ g ₉ g dUGAU ₈ GagcgcgcguuagccGaa Agcgcgc B	6352

Table 43

402	UUAUCAU C UUGCUU	6003	18352	HBV-402 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa Aaguuaa B	6353
423	UGCUGCU A UGCUCUA	6004	18353	HBV-423 Rz-7' aliyl stab1	u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AagaaBa B	6354
429	UAUGCCU C AUUCUU	6005	18354	HBV-429 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa Aggaaaa B	6355
679	GUCAGU U UACUAGU	6006	18356	HBV-679 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa Aauggaa B	6356
680	CUCAGU U ACUAGUG	6007	18357	HBV-680 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaauagB B	6357
681	UCAGUUA U CUAGGCU	6008	18358	HBV-681 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaagaaB B	6358
684	GUUUUAU A GUGCCAU	6009	18359	HBV-684 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AagaaBa B	6359
692	UGGCCAU U UGUUCAG	6010	18360	HBV-692 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa Aauggaa B	6360
693	UGCCAUU U GUUCUAG	6011	18361	HBV-693 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa Aauggaa B	6361
1534	GCGACCU C UUUUAC	6012	18363	HBV-1534 Rz-7' aliyl stab1	g ₉ u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AgugguB B	6362
1536	CACCUU C UUUUACG	6013	18364	HBV-1536 Rz-7' aliyl stab1	g ₉ u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AgugguB B	6363
1538	CUUCUUC U UACGGGG	6014	18365	HBV-1538 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6364
1787	AGCGUUC A GCGUUGU	6015	18369	HBV-1787 Rz-7' aliyl stab1	u ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6365
1793	UAGCGAU A AAGUUGU	6016	18370	HBV-1793 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6366
1874	CAAGCCU C CAAGCUG	6017	18372	HBV-1874 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6367
1887	UGGUGCU U GCGUGGC	6018	18373	HBV-1887 Rz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AgugguB B	6368
2283	AAGAAUC C CUUGGCC	6019	18375	HBV-2283 Rz-7' aliyl stab1	g ₉ u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6369
2828	ACCAUUC U CUUGGGA	6020	18377	HBV-2828 Rz-7' aliyl stab1	u ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6370
2829	CCAAUUC U UUGGGAA	6021	18378	HBV-2831 Rz-7' aliyl stab1	u ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6371
2831	AUAUUCU U GCGGAACA	6022	18380	HBV-2831 Rz-7' aliyl stab1	u ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6372
256	UUAUAGC U CGUGUGG	6023	18381	HBV-256 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6373
267	GGUGGAC U UGUUCUA	6024	18382	HBV-267 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6374
270	GGACUUC U UCUAUUU	6025	18383	HBV-270 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6375
272	ACUCUUC U CAUUUUU	6026	18384	HBV-272 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6376
274	UUCUGUC A AUUUUUU	6027	18385	HBV-274 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6377
386	AUGUGUC U GCGUGGU	6028	18386	HBV-386 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6378
419	AUCUGUC U GCGUGGU	6029	18387	HBV-419 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6379
422	CUGUGUC U AUGCCUC	6030	18388	HBV-422 Chz-7' aliyl stab1	g ₉ u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6380
427	GCUAUGC C UCAUUCU	6031	18389	HBV-427 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6381
428	CUAUGC C UAUUCUG	6032	18390	HBV-428 Chz-7' aliyl stab1	g ₉ u ₉ s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6382
430	AUGGCCU A UCUUCUU	6033	18392	HBV-430 Chz-7' aliyl stab1	a ₉ s ₉ ^g s ₉ ^g s ₉ g ₉ aa cUGAU ₉ GaggcgcuuagggccGaa AaugguB B	6383

Table 43

608	UGUUAUC C CAUCCCA	6034	18393	HBV-608 CHz-7 aliyl stab1	u ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lauaaca B	6384
609	GUUAUCC C AUCCGAU	6035	18394	HBV-609 CHz-7 aliyl stab1	a ₉ u ₉ s ₉ s ₉ s ₉ cUGAUgagggcguaagggccGaa lgaauac B	6385
659	GUUUUUC C UUGCCUA	6036	18395	HBV-669 CHz-7 aliyl stab1	u ₉ s ₉ s ₉ s ₉ s ₉ cUGAUgagggcguaagggccGaa lgaauac B	6386
689	CUAGUGC C AUUUGU	6037	18398	HBV-689 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lcauag B	6387
690	UAGUGCC C UUUUUC	6038	18399	HBV-690 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ aaa cUGAUgagggcguaagggccGaa lgaucua B	6388
718	GUUUUUC C CCACUG	6039	18400	HBV-718 CHz-7 aliyl stab1	u ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lgaaguc B	6389
1149	CUUUUAC C CCGUUG	6040	18401	HBV-1149 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa luuaagc B	6390
1535	GCACUUC C CUUUACG	6041	18408	HBV-1535 CHz-7 aliyl stab1	c ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lgaaguc B	6391
1537	ACGUUUC C UUAUGG	6042	18409	HBV-1537 CHz-7 aliyl stab1	c ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lgaaguc B	6392
1791	UGUAGGC A UAAUUG	6043	18413	HBV-1791 CHz-7 aliyl stab1	c ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lcauaca B	6393
1831	UUUUCAC C UGUGCUA	6044	18415	HBV-1831 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ aug cUGAUgagggcguaagggccGaa lugaaca B	6394
1832	UUUUCAC C UGUGCUA	6045	18416	HBV-1832 CHz-7 aliyl stab1	u ₉ s ₉ s ₉ s ₉ s ₉ cag cUGAUgagggcguaagggccGaa lugaaca B	6395
1872	UUGAAGC C UCCAAGC	6046	18417	HBV-1872 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lcuuuga B	6396
1873	UCAAGCC C CCAAGCU	6047	18418	HBV-1873 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lcuuuga B	6397
1875	AAGCUUC C AAGUCUG	6048	18419	HBV-1875 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6398
1876	AGCUUCC A AGUCUG	6049	18421	HBV-1876 CHz-7 aliyl stab1	c ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6399
1880	UCCAAGC U GUGCCU	6050	18423	HBV-1880 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cag cUGAUgagggcguaagggccGaa lcuuuga B	6400
2382	GAAGAUC U CGCUCGC	6051	18424	HBV-2382 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6401
2384	AGAAGUC C CUGGCCU	6052	18425	HBV-2384 CHz-7 aliyl stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6402
2385	GAAGUCC C UCGCCUC	6053	18426	HBV-2385 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6403
2422	GCUGGC A GAAGUIC	6054	18427	HBV-2422 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6404
2830	CAUUAUC U UGGGAAC	6055	18428	HBV-2830 CHz-7 aliyl stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6405
234	AUUCU C ACAUA	6056	19178	HBV-234 Rz-6 amino stab1	u ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6406
252	GAGUCU A CUCUG	6057	19180	HBV-252 Rz-6 amino stab1	c ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6407
268	UGAGUCU A CUCUC	6058	19182	HBV-268 Rz-6 amino stab1	u ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6408
280	AUUUUU C UAAGGG	6059	19190	HBV-280 Rz-6 amino stab1	c ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6409
313	CAAAAU U CGGAGU	6060	19191	HBV-313 Rz-6 amino stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6410
395	GCUGUU U UAUCAU	6061	19195	HBV-395 Rz-6 amino stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6411
402	UAUACA C UUCUCC	6062	19196	HBV-402 Rz-6 amino stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6412
607	UGUAUUC C ACAUCC	6063	19200	HBV-607 Rz-6 amino stab1	g ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6413
697	UUUGUU C CAGUGU	6064	19207	HBV-697 Rz-6 amino stab1	a ₉ s ₉ s ₉ s ₉ s ₉ cug cUGAUgagggcguaagggccGaa lgaaguc B	6414

Table 43

1539	UCUCUUU	U AC GCGG	6065	19211	HBV-1539 Rz-6 amino slab1	C ₆ S ₆ C ₆ gu cUGAUGagggccguuagggcGaa Aagaga B	6415
1599	UCACCU	C UGCAGC	6066	19212	HBV-1599 Rz-6 amino slab1	C ₆ S ₆ U ₆ g ₆ ca cUGAUGagggccguuagggcGaa Agguga B	6416
1607	GCAGCU	C GCAUGG	6067	19213	HBV-1607 Rz-6 amino slab1	C ₆ S ₆ U ₆ g ₆ ca cUGAUGagggccguuagggcGaa Agguga B	6417
1833	UCACCU	C UGCUCU	6068	19216	HBV-1833 Rz-6 amino slab1	U ₆ S ₆ U ₆ g ₆ g ₆ ca cUGAUGagggccguuagggcGaa Agguga B	6418
2383	AGAAUC	C CCUCUG	6069	19219	HBV-2383 Rz-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Aqucuu B	6419
2429	GAGAUC	C UCAAUC	6070	19221	HBV-2429 Rz-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Auccuu B	6420
2831	UUUUU	U GGGAAC	6071	19224	HBV-2831 Rz-6 amino slab1	g ₆ U ₆ U ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Agauaa B	6421
430	UGGCUU	A UCUUUC	6072	19236	HBV-430 CHZ-6 amino slab1	ag ₆ S ₆ U ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa laggca B	6422
676	UGGCUU	A GUUUAC	6073	19241	HBV-676 CHZ-6 amino slab1	g ₆ U ₆ U ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa laggca B	6423
683	GUUUAC	C UGUUUC	6074	19242	HBV-683 CHZ-6 amino slab1	g ₆ U ₆ U ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa luuaac B	6424
1150	UUUAGC	C AGUUGC	6075	19247	HBV-1150 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa lguaaa B	6425
1200	GCAACC	C CCAUUG	6076	19248	HBV-1200 CHZ-6 amino slab1	C ₆ S ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa lguugc B	6426
1201	CACACC	C CACUUG	6077	19249	HBV-1201 CHZ-6 amino slab1	C ₆ S ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa lguugc B	6427
1444	CGGGCC	C GAUUGC	6078	19250	HBV-1444 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lggccg B	6428
1451	GAUUGC	C CGGGAC	6079	19251	HBV-1451 CHZ-6 amino slab1	g ₆ U ₆ U ₆ S ₆ C ₆ g ₆ gu cUGAUGagggccguuagggcGaa lguauu B	6429
1533	CGACCU	U CUCUUU	6080	19252	HBV-1533 CHZ-6 amino slab1	ag ₆ S ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa lguugc B	6430
1600	CACCUU	U GGACGU	6081	19255	HBV-1600 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6431
1698	CCGACU	U AGAGGC	6082	19256	HBV-1698 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6432
1784	GGAGGC	U GUAGGC	6083	19257	HBV-1784 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6433
1829	UUUUUC	A CCUCUG	6084	19259	HBV-1829 CHZ-6 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6434
1876	GCCUUC	C ACGUUG	6085	19265	HBV-1876 CHZ-6 amino slab1	ag ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6435
1880	CCAGGC	U GUGCCU	6086	19267	HBV-1880 CHZ-6 amino slab1	ag ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6436
218	UUUUUC	U GUUGGA	6087	19178	HBV-218 Rz-7 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa lguugc B	6437
257	CUAGACU	C GUUGAC	6088	19181	HBV-257 Rz-7 amino slab1	C ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa Agaaaa B	6438
268	GUGGACU	U CUCUAA	6089	19183	HBV-268 Rz-7 amino slab1	U ₆ U ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Aguccaa B	6439
269	AGGACU	C UCUCAA	6090	19184	HBV-269 Rz-7 amino slab1	ag ₆ U ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Aguccaa B	6440
271	GAGUUCU	C CAUUUU	6091	19185	HBV-271 Rz-7 amino slab1	ag ₆ U ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Aguccaa B	6441
273	CUUCUCU	C AAUUUC	6092	19186	HBV-273 Rz-7 amino slab1	g ₆ S ₆ U ₆ g ₆ g ₆ g ₆ gu cUGAUGagggccguuagggcGaa Aguccaa B	6442
277	UCUCAAU	U UCUAGG	6093	19187	HBV-277 Rz-7 amino slab1	C ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa Auugag B	6443
278	CUCAAUU	U UCUAGG	6094	19188	HBV-278 Rz-7 amino slab1	C ₆ S ₆ U ₆ g ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa Auugag B	6444
279	UCAUUUU	U CUAGGG	6095	19189	HBV-279 Rz-7 amino slab1	C ₆ S ₆ C ₆ U ₆ g ₆ g ₆ cu cUGAUGagggccguuagggcGaa Aauuga B	6445

Table 43

314	CAAAUUC G CGGCGC	6096	19192	HBV-314 Rz-7 amino stab1	g ₉ g ₈ a ₆ c ₅ u ₄ g ₃ cU ₂ GAUGagggcguaagggccGaa Auuuag B	6446
385	GAUGUGU C UGCGCG	6097	19193	HBV-385 Rz-7 amino stab1	c ₉ g ₈ c ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Acauac B	6447
394	GCAGCGU U UUAUAC	6098	19194	HBV-394 Rz-7 amino stab1	a ₉ g ₈ a ₆ a ₅ u ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Aagcgc B	6448
402	UUAUACU C UUCUCU	6099	19197	HBV-402 Rz-7 amino stab1	u ₉ g ₈ a ₆ g ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Augaaua B	6449
423	UGUGUCU C AUGCUCA	6100	19198	HBV-423 Rz-7 amino stab1	u ₉ g ₈ a ₆ g ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Agcaaca B	6450
429	UAUGUCU C AUUCUUA	6101	19199	HBV-429 Rz-7 amino stab1	a ₉ g ₈ a ₆ a ₅ u ₄ u ₃ cU ₂ GAUGagggcguaagggccGaa Aggcaua B	6451
479	GCUCAGU U UACUAGU	6102	19201	HBV-579 Rz-7 amino stab1	c ₉ a ₈ c ₅ u ₄ g ₃ u ₂ g ₁ cU ₂ GAUGagggcguaagggccGaa Acauagc B	6452
680	CUCAGUU U ACUAGUC	6103	19202	HBV-680 Rz-7 amino stab1	c ₉ a ₈ c ₅ u ₄ g ₃ u ₂ g ₁ cU ₂ GAUGagggcguaagggccGaa Acauagc B	6453
681	UCAGUUU A CUGUCC	6104	19203	HBV-581 Rz-7 amino stab1	g ₉ g ₈ c ₅ u ₄ g ₃ cU ₂ GAUGagggcguaagggccGaa Auuuac B	6454
684	GUUUAU A GUGCCAU	6105	19204	HBV-584 Rz-7 amino stab1	a ₉ g ₈ a ₆ g ₅ g ₄ cU ₂ GAUGagggcguaagggccGaa Auuuac B	6455
692	GUGCCAU U UGUUACG	6106	19205	HBV-593 Rz-7 amino stab1	c ₉ u ₈ g ₅ a ₆ a ₅ cU ₂ GAUGagggcguaagggccGaa Auguac B	6456
693	UGCCAUU U GUUACGU	6107	19206	HBV-593 Rz-7 amino stab1	a ₉ g ₈ a ₆ g ₅ g ₄ cU ₂ GAUGagggcguaagggccGaa Auguac B	6457
1534	CGCACCU C UCUUAC	6108	19208	HBV-1534 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6458
1536	CACCCU C UUUACGC	6109	19209	HBV-1536 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6459
1538	CGUCUCU U UACCGCG	6110	19210	HBV-1538 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6460
1787	AGGUGU A GGCAUAA	6111	19214	HBV-1787 Rz-7 amino stab1	a ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6461
1793	UAGGCAU A AAUUGUG	6112	19215	HBV-1793 Rz-7 amino stab1	c ₉ a ₈ c ₅ u ₄ g ₃ u ₂ g ₁ cU ₂ GAUGagggcguaagggccGaa Auguac B	6462
1874	CAAGCCU C CAAGCUG	6113	19217	HBV-1874 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6463
1887	UUGGCCU U GGGUGGC	6114	19218	HBV-1887 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6464
2383	AAGAACU C CCUCGCC	6115	19220	HBV-2383 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6465
2828	ACCAUUC U CUUGGGA	6116	19222	HBV-2828 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6466
2829	CCAAUUC U UUGGGAA	6117	19223	HBV-2829 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6467
2831	AUAUUC U GGGGAAC	6118	19225	HBV-2831 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6468
256	UCUAGAC U CGUGGUG	6119	19226	HBV-256 Rz-7 amino stab1	c ₉ a ₈ c ₅ u ₄ g ₃ u ₂ g ₁ cU ₂ GAUGagggcguaagggccGaa Auguac B	6469
267	GGUGGAC U UCUCUCA	6120	19227	HBV-267 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6470
270	GGACUUC U GUCAAU	6121	19228	HBV-270 Rz-7 amino stab1	a ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6471
272	ACUUCUC U CAAUUU	6122	19229	HBV-272 Rz-7 amino stab1	u ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6472
274	UUCUCUC A AUUUUU	6123	19230	HBV-274 Rz-7 amino stab1	a ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6473
386	AUGUGUC U GCGCGGU	6124	19231	HBV-386 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6474
419	AUCCUGC U GGUUAGC	6125	19232	HBV-419 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6475
422	CUGCGUC U AUGCCUC	6126	19233	HBV-422 Rz-7 amino stab1	g ₉ g ₈ a ₆ a ₅ g ₄ a ₃ cU ₂ GAUGagggcguaagggccGaa Auguac B	6476

Table 43

1881	CCUCCAAAGCU G UCGCGU	6158	20085	HBV-1881 GCI.Rz-5/10 statb2	a ₉ s ₉ a ₉ uCAU ₉ g gtauGcaucaugc gcy agcuugagag B	6508
1883	UCCAAAGCGU G CCUUGU	6159	20086	HBV-1883 GCI.Rz-5/10 statb2	c ₉ s ₉ a ₉ uCAU ₉ g gtauGcaucaugc gcy acacugaga B	6509
2388	GAAUCUCCU G CCUUG	6160	20087	HBV-2388 GCI.Rz-5/10 statb2	c ₉ s ₉ a ₉ uCAU ₉ g gtauGcaucaugc gcy ugagagaguc B	6510
391	CGUGGAG G UGUUGCG	6161	20081	HBV-381 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ a ₉ GCGaaagGCGaGugaGGuCu auaacga B	6511
392	CGUGGCG G UUUUAUC	6162	20092	HBV-392 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ a ₉ GCGaaagGCGaGugaGGuCu gcgcagag B	6512
420	UUGCGU G CUUAUCC	6163	20093	HBV-420 Zin.Rz-7 amino statb2	g ₉ s ₉ c ₉ a ₉ gag GCGaaagGCGaGugaGGuCu ajacagaga B	6513
648	UAUGGGA G UGGGCGU	6164	20094	HBV-648 Zin.Rz-7 amino statb2	a ₉ s ₉ s ₉ c ₉ cca GCGaaagGCGaGugaGGuCu uccuaca B	6514
711	UUGGAG G UGGGCGU	6165	20095	HBV-711 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu uccuaca B	6515
1262	CCUCGU G CCUAUCC	6166	20096	HBV-1262 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu agagagag B	6516
1835	CACCGU G CCUAUUC	6167	20097	HBV-1835 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu agagagag B	6517
2388	CUCUCCU G CCUUGGA	6168	20098	HBV-2388 Zin.Rz-7 amino statb2	u ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu gaagagag B	6518
192	GACCCU G CUUGGU	6169	20099	HBV-192 Zin.Rz-7 amino statb2	a ₉ s ₉ s ₉ s ₉ ag GCGaaagGCGaGugaGGuCu agagagag B	6519
198	UGUCCU G UUAAGG	6170	20100	HBV-198 Zin.Rz-7 amino statb2	c ₉ s ₉ a ₉ s ₉ uaa GCGaaagGCGaGugaGGuCu acagaca B	6520
315	AAAAUUC G CAGUCC	6171	20101	HBV-315 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu gaauuuu B	6521
383	GGAUUC G UGUCCG	6172	20102	HBV-383 Zin.Rz-6 amino statb2	c ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu acauuca B	6522
383	UGGAUUC G UGUCCG	6173	20103	HBV-383 Zin.Rz-7 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu agacac B	6523
387	GUGUCU G CGCGU	6174	20104	HBV-387 Zin.Rz-6 amino statb2	u ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu agacac B	6524
390	GUUGUGG G CGUUUA	6175	20105	HBV-390 Zin.Rz-7 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu cgcgca B	6525
392	UGCGCG G UUUUAU	6176	20106	HBV-392 Zin.Rz-6 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu cgcgca B	6526
425	UGCUAU G CCUUAU	6177	20107	HBV-425 Zin.Rz-6 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6527
468	GUAGUU G CCGUUU	6178	20108	HBV-468 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6528
476	CCCGUUU G UCCUUA	6179	20109	HBV-476 Zin.Rz-7 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6529
648	AUGGGA G UGGGCC	6180	20110	HBV-648 Zin.Rz-6 amino statb2	u ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6530
694	GCAUUU G UUCAGU	6181	20111	HBV-694 Zin.Rz-7 amino statb2	c ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu uccuaca B	6531
699	UUGUUA G UGUUUG	6182	20112	HBV-699 Zin.Rz-7 amino statb2	c ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6532
1262	UCCUUA G CCGAUC	6183	20113	HBV-1262 Zin.Rz-6 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6533
1440	CCCGUUC G CCGUUA	6184	20114	HBV-1440 Zin.Rz-7 amino statb2	u ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6534
1526	CACGGG G CGCAC	6185	20115	HBV-1526 Zin.Rz-6 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu cgcgca B	6535
1526	CCAGCGG G CGACCU	6186	20116	HBV-1526 Zin.Rz-6 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu cgcgca B	6536
1557	CCCGUUU G UGCGUUC	6187	20117	HBV-1557 Zin.Rz-7 amino statb2	a ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu cgcgca B	6537
		6188	20118	HBV-1557 Zin.Rz-7 amino statb2	g ₉ s ₉ a ₉ s ₉ ag GCGaaagGCGaGugaGGuCu auaagca B	6538

Table 43

1559	CGCUGU G CCUUCUC	6189	20119	HBV-1589 Zin Rz-7	amino stab2	g ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu acagagc B	6539
1590	GCACUG G CCUACCC	6190	20120	HBV-1590 Zin Rz-7	amino stab2	g ₉ s ₉ g ₉ s ₉ g ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu gaaguc B	6540
1835	ACCUCU G CCUAU	6191	20121	HBV-1835 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6541
2311	ACCAAU G CGCCUA	6192	20122	HBV-2311 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu auuaguc B	6542
2420	CGCGUG G CAGAGA	6193	20123	HBV-2420 Zin Rz-7	amino stab2	u ₉ s ₉ u ₉ u ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6543
65	CCUSGUG G UGCGUC	6194	20124	HBV-65 Zin Rz-7	amino stab2	g ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu cagagc B	6544
192	ACCCGU G CUCGUC	6195	20125	HBV-192 Zin Rz-6	amino stab2	c ₉ u ₉ c ₉ g ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6545
198	CGUGUG G UUCACG	6196	20126	HBV-198 Zin Rz-6	amino stab2	u ₉ s ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6546
258	UAGACUG G UGGUGA	6197	20127	HBV-258 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6547
261	ACUCGUG G UGGACU	6198	20128	HBV-261 Zin Rz-7	amino stab2	g ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agagagc B	6548
315	AAAUUG G CAGUCC	6199	20129	HBV-315 Zin Rz-6	amino stab2	g ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu auccagc B	6549
381	UUGUGUG G CGCGUU	6200	20130	HBV-381 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu auccagc B	6550
387	UGUGUGU G CGCGUU	6201	20131	HBV-387 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu auccagc B	6551
390	UCUGCG G CGUUUU	6202	20132	HBV-390 Zin Rz-6	amino stab2	u ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agcagc B	6552
417	CAUCGU G CUGCUA	6203	20133	HBV-417 Zin Rz-6	amino stab2	g ₉ s ₉ a ₉ g ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agcagc B	6553
420	CCUGCU G CUAUGC	6204	20134	HBV-420 Zin Rz-6	amino stab2	g ₉ s ₉ a ₉ g ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu agcagc B	6554
468	UAUGUU G CCGUU	6205	20135	HBV-468 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu aaacagc B	6555
476	CCGUUU G UCCUCU	6206	20136	HBV-476 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu aaacagc B	6556
677	GGCUCA G UUAUCU	6207	20137	HBV-677 Zin Rz-7	amino stab2	u ₉ s ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6557
677	UGGCUCA G UUAUCU	6208	20138	HBV-677 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6558
685	UUUACUA G UGCCAU	6209	20139	HBV-685 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6559
685	UUUACUA G UGCCAU	6210	20140	HBV-685 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6560
687	UUAUCUA G UGCUUG	6211	20141	HBV-687 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6561
689	UGUUA G UGUUUG	6212	20142	HBV-689 Zin Rz-6	amino stab2	u ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6562
702	UCAGUG G UUGCUA	6213	20143	HBV-702 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6563
711	CGUAGG G CUUUG	6214	20144	HBV-711 Zin Rz-6	amino stab2	g ₉ s ₉ g ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6564
1006	UUGUGG G UCUUUU	6215	20145	HBV-1006 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6565
1103	UUUUCU G CCACU	6216	20146	HBV-1103 Zin Rz-6	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6566
1103	UUUUCU G CCACU	6217	20147	HBV-1103 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6567
1184	GCCAAU G UUGUCU	6218	20148	HBV-1184 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6568
		6219	20149	HBV-1184 Zin Rz-7	amino stab2	a ₉ u ₉ u ₉ a ₉ g ₉ Gcg ₉ aaagGCGaGugaGGuCu ugaucac B	6569

Table 43

1440	CGUGCG G CGUGA	6220	20150	HBV-1410 Zin Rz-6	amino stab2	U ₅ C ₅ A ₅ G ₅ g CcGpaaagGCGaGugaGGuCu opaagc B	6570
1442	GUCGGC G CUGAAU	6221	20151	HBV-1442 Zin Rz-6	amino stab2	A ₅ U ₅ C ₅ g CcGpaaagGCGaGugaGGuCu gcoagc B	6571
1442	CGUOGCG C CUGAAU	6222	20152	HBV-1442 Zin Rz-7	amino stab2	gA ₅ U ₅ U ₅ g CcGpaaagGCGaGugaGGuCu gcoagc B	6572
1553	CUCGCC G UCUGUG	6223	20153	HBV-1553 Zin Rz-6	amino stab2	C ₅ g ₅ C ₅ A ₅ g CcGpaaagGCGaGugaGGuCu gggagc B	6573
1557	CGGUUC G UGCUUU	6224	20154	HBV-1557 Zin Rz-6	amino stab2	A ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu aagcgc B	6574
1559	CGUGUG G CCUUCU	6225	20155	HBV-1559 Zin Rz-6	amino stab2	g ₅ C ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu acagcg B	6575
1583	CGUGUG G CAGUUC	6226	20156	HBV-1583 Zin Rz-6	amino stab2	g ₅ C ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu acagcg B	6576
1590	CACUUC G CUACAC	6227	20157	HBV-1590 Zin Rz-6	amino stab2	g ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu gaagcg B	6577
1622	ACCACC G UGACGC	6228	20158	HBV-1622 Zin Rz-6	amino stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu gguagc B	6578
1870	UGUCAA G CCUCCAA	6229	20159	HBV-1870 Zin Rz-7	amino stab2	U ₅ U ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu uugaaca B	6579
1881	CGAAGU G UGCGUUG	6230	20160	HBV-1881 Zin Rz-7	amino stab2	C ₅ A ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu agcuuagc B	6580
1883	AGCUGU G CCUUGG	6231	20161	HBV-1883 Zin Rz-6	amino stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu acagcuu B	6581
1883	AAGCUGU G CCUUGG	6232	20162	HBV-1883 Zin Rz-7	amino stab2	U ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu auuagc B	6582
2311	CCAAAU G CCCCUA	6233	20163	HBV-2311 Zin Rz-6	amino stab2	g ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu aacagcu B	6583
2347	ACUGUU G UUAGAC	6234	20164	HBV-2347 Zin Rz-6	amino stab2	A ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuagcuu B	6584
2364	AGCGAG G UCCCCU	6235	20165	HBV-2364 Zin Rz-6	amino stab2	U ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuagcuu B	6585
2364	GAGGCAG G UCCCCUA	6236	20166	HBV-2364 Zin Rz-7	amino stab2	U ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuagcuu B	6586
2388	UCCGUC G CCUUGC	6237	20167	HBV-2388 Zin Rz-6	amino stab2	g ₅ C ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu gaagcg B	6587
2393	CGCCUC G CAGACG	6238	20168	HBV-2393 Zin Rz-6	amino stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu gggcg B	6588
2417	CGCCGC G UGCGAG	6239	20169	HBV-2417 Zin Rz-6	amino stab2	CcGpaaagGCGaGugaGGuCu gggcg B	6589
2420	CGCGUC G CAGAGG	6240	20170	HBV-2420 Zin Rz-6	amino stab2	C ₅ U ₅ C ₅ g ₅ g CcGpaaagGCGaGugaGGuCu gggcg B	6590
2474	CAUAA G UGGGAA	6241	20171	HBV-2474 Zin Rz-6	amino stab2	U ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6591
381	CGUGAU G UGUCUG	6242	20172	HBV-381 Amb Rz-7	stab2	g ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6592
648	UAUGGA G UGGGCU	6243	20173	HBV-648 Amb Rz-7	stab2	A ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6593
198	UGUCUG G UUAACG	6244	20174	HBV-198 Amb Rz-7	stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6594
377	UAUCGU G GAUGUG	6245	20175	HBV-377 Amb Rz-7	stab2	A ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6595
378	AUGCGU G AUGUUC	6246	20176	HBV-378 Amb Rz-7	stab2	g ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6596
383	UGAUGU G UGUCGG	6247	20177	HBV-383 Amb Rz-7	stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6597
648	GAUGU G UGUCGG	6248	20178	HBV-383 Amb Rz-6	stab2	C ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6598
648	AUGGA G UGGGCC	6249	20179	HBV-648 Amb Rz-6	stab2	g ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6599
650	UGGAGU G GGCCUA	6250	20180	HBV-650 Amb Rz-7	stab2	U ₅ g ₅ g ₅ g ₅ g CcGpaaagGCGaGugaGGuCu cuuagc B	6600

Table 43

650	GGGAGU G GGCUCU	6251	20181	HBV-650 Amb.Rz-6 slab2	g ₉ a ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG accuacc B	6601
684	GCAUUU G UUCAGU	6252	20182	HBV-694 Amb.Rz-7 slab2	c ₆ a ₆ c ₆ u ₆ gaa gga L ucCCUUCaagg L ucCGGG acuuacc B	6602
689	UUGUUA G UGUUUG	6253	20183	HBV-699 Amb.Rz-7 slab2	c ₆ a ₆ a ₆ c ₆ aa gga L ucCCUUCaagg L ucCGGG ugaacca B	6603
701	GUUCAGU G GULUGU	6254	20184	HBV-701 Amb.Rz-7 slab2	u ₆ a ₆ c ₆ g ₆ aac gga L ucCCUUCaagg L ucCGGG accuacc B	6604
710	UUCGUAG G GCUUUC	6255	20185	HBV-710 Amb.Rz-7 slab2	g ₆ g ₆ a ₆ g ₆ agc gga L ucCCUUCaagg L ucCGGG cuaggaa B	6605
1525	CCACGG G GCGCAC	6256	20186	HBV-1525 Amb.Rz-6 slab2	g ₉ a ₉ c ₉ g ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG ccggaa B	6606
1624	CACCGU G AACGCC	6257	20187	HBV-1624 Amb.Rz-6 slab2	g ₉ a ₉ c ₉ g ₉ uu gga L ucCCUUCaagg L ucCGGG accgaa B	6607
2069	CACUUA G GCAAGC	6258	20188	HBV-2069 Amb.Rz-6 slab2	g ₉ c ₉ a ₉ g ₉ uu gga L ucCCUUCaagg L ucCGGG ugaagaa B	6608
2375	CCUAGAA G AAGACU	6259	20189	HBV-2375 Amb.Rz-7 slab2	a ₉ g ₉ u ₉ c ₉ uu gga L ucCCUUCaagg L ucCGGG uuuagaa B	6609
2476	AUAGGU G GGAACU	6260	20190	HBV-2476 Amb.Rz-7 slab2	a ₉ g ₉ u ₉ u ₉ u ₉ cc gga L ucCCUUCaagg L ucCGGG accuuuu B	6610
65	CGUCUG G UGGCUC	6261	20191	HBV-65 Amb.Rz-7 slab2	g ₉ g ₉ a ₉ g ₉ cca gga L ucCCUUCaagg L ucCGGG cagcagg B	6611
67	GCUGGU G GCUCCA	6262	20192	HBV-67 Amb.Rz-6 slab2	u ₉ g ₉ g ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG accagc B	6612
198	GCUCGU G UUCAG	6263	20193	HBV-198 Amb.Rz-6 slab2	c ₆ g ₆ a ₆ g ₆ aa gga L ucCCUUCaagg L ucCGGG accagc B	6613
260	GACUCGU G GUGGACU	6264	20194	HBV-260 Amb.Rz-7 slab2	a ₉ g ₉ u ₉ c ₉ acc gga L ucCCUUCaagg L ucCGGG accagaa B	6614
263	UCUGGU G GACUUCU	6265	20195	HBV-263 Amb.Rz-7 slab2	a ₉ g ₉ a ₉ a ₉ g ₉ uc gga L ucCCUUCaagg L ucCGGG accagaa B	6615
377	AUCGGU G GAUGUG	6266	20196	HBV-377 Amb.Rz-6 slab2	c ₆ g ₆ c ₆ g ₆ uc gga L ucCCUUCaagg L ucCGGG agcga B	6616
378	CCGUGU G AUGUGU	6267	20197	HBV-378 Amb.Rz-6 slab2	a ₉ c ₉ a ₉ c ₉ uu gga L ucCCUUCaagg L ucCGGG cagga B	6617
476	CCGUUU G UCUCU	6268	20198	HBV-476 Amb.Rz-6 slab2	a ₉ g ₉ a ₉ g ₉ g ₉ gga L ucCCUUCaagg L ucCGGG aaacgg B	6618
651	GGGAGU G GCUACG	6269	20199	HBV-651 Amb.Rz-7 slab2	c ₆ g ₆ g ₆ a ₆ g ₆ cc gga L ucCCUUCaagg L ucCGGG cacucc B	6619
677	UGGCUCA G UUUACUA	6270	20200	HBV-677 Amb.Rz-7 slab2	u ₆ g ₆ g ₆ u ₆ aaa gga L ucCCUUCaagg L ucCGGG ugaacca B	6620
685	UUUACUA G UGCCAUU	6271	20201	HBV-685 Amb.Rz-7 slab2	a ₉ a ₉ u ₉ g ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG uaguaaa B	6621
702	UUCAGU G UUCGUAG	6272	20202	HBV-702 Amb.Rz-7 slab2	c ₆ u ₆ a ₆ c ₆ g ₆ aa gga L ucCCUUCaagg L ucCGGG cacugaa B	6622
709	GUUCUA G GGCUAU	6273	20203	HBV-709 Amb.Rz-7 slab2	g ₉ a ₉ a ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG uaccga B	6623
710	UCGUAG G GCUUUC	6274	20204	HBV-710 Amb.Rz-6 slab2	g ₉ a ₉ a ₉ g ₉ cc gga L ucCCUUCaagg L ucCGGG cuaggaa B	6624
747	UAUGGAU G AUGUGGU	6275	20205	HBV-747 Amb.Rz-7 slab2	a ₉ c ₉ c ₉ a ₉ c ₉ uu gga L ucCCUUCaagg L ucCGGG accucaa B	6625
1557	CCGUGU G UGCCUU	6276	20206	HBV-1557 Amb.Rz-6 slab2	a ₉ a ₉ g ₉ g ₉ ca gga L ucCCUUCaagg L ucCGGG agacgg B	6626
1881	CCAGCU G UGCUGU	6277	20207	HBV-1881 Amb.Rz-7 slab2	c ₆ g ₆ a ₆ g ₆ g ₆ cc gga L ucCCUUCaagg L ucCGGG agcuuagg B	6627
2347	ACUGUU G UUAAGC	6278	20208	HBV-2347 Amb.Rz-6 slab2	g ₉ g ₉ c ₉ g ₉ uu gga L ucCCUUCaagg L ucCGGG aacugg B	6628
2375	CUAGAA G AAGAAC	6279	20209	HBV-2375 Amb.Rz-6 slab2	g ₉ u ₉ u ₉ c ₉ uu gga L ucCCUUCaagg L ucCGGG uuuag B	6629
2378	GAGGAA G AAGUCC	6280	20210	HBV-2378 Amb.Rz-6 slab2	g ₉ g ₉ c ₉ g ₉ uu gga L ucCCUUCaagg L ucCGGG uuuuac B	6630
2423	CGUGCA G AGAUCU	6281	20211	HBV-2423 Amb.Rz-7 slab2	a ₉ g ₉ a ₉ u ₉ c ₉ uu gga L ucCCUUCaagg L ucCGGG ugagacc B	6631

Table 43

2426	GCAGAA G AUCUCA	6282	20212	HBV-2426 Amb.Rz-6 slab2	u ₅ g ₅ a ₅ g ₅ au gga L ucCCUUCaagg L ucCGGG uucugc B	6632
2426	CGCAGAA G AUCUCA	6283	20213	HBV-2426 Amb.Rz-7 slab2	u ₅ u ₅ g ₅ a ₅ g ₅ au gga L ucCCUUCaagg L ucCGGG uucugc B	6633
2476	UAAGGU G GGAAC	6284	20214	HBV-2476 Amb.Rz-6 slab2	g ₅ u ₅ g ₅ u ₅ cc gga L ucCCUUCaagg L ucCGGG accuaa B	6634
2477	UAAGGU G GAAACU	6285	20215	HBV-2477 Amb.Rz-7 slab2	a ₅ g ₅ g ₅ u ₅ u ₅ cc gga L ucCCUUCaagg L ucCGGG cacuaa B	6635
2477	UAAGGU G GAAACU	6286	20216	HBV-2477 Amb.Rz-6 slab2	a ₅ g ₅ u ₅ g ₅ u ₅ cc gga L ucCCUUCaagg L ucCGGG cacuaa B	6636
1607	UGCACGU C GCAUGGA	6287	20687	HBV-1607 Rz-7 allv slab1 (7/4)	u ₅ c ₅ g ₅ a ₅ ugc cUGAUgagcgguuagccGaa Agugca B	6637
1887	GUGCCU U GGGUGG	6288	20688	HBV-1887 Rz-6 allv slab1 (6/4)	c ₅ g ₅ a ₅ c ₅ cc cUGAUgagcgguuagccGaa Aggcaac B	6638
1607	GCACGU C GCAUGG	6289	20689	HBV-1607 Rz-6 allv slab1 (6/3)	c ₅ g ₅ a ₅ u ₅ g ₅ cc cUGAUgagcgguuagccGaa Agugca B	6639
1607	UGCACGU C GCAUGGA	6290	20700	HBV-1607 Rz-7 allv slab1 (7/3)	u ₅ c ₅ g ₅ a ₅ ugc cUGAUgagcgguuagccGaa Agugca B	6640
1887	GUGCCU U GGGUGG	6291	20701	HBV-1887 Rz-6 allv slab1 (6/3)	c ₅ g ₅ a ₅ c ₅ cc cUGAUgagcgguuagccGaa Aggcaac B	6641
1887	UGUGCCU U GGGUGGC	6292	20702	HBV-1887 Rz-7 allv slab1 (7/3)	g ₅ g ₅ c ₅ a ₅ cc cUGAUgagcgguuagccGaa Aggcaac B	6642

UPPER CASE = RIBO

lower case = 2'-O-methyl

s = phosphorothioate linkage

B = inverted deoxyribose residue

U = 2'-deoxy-2'-C-allyl Uridine

U' = 2'-deoxy-2'-amino Uridine

C = 2'-deoxy-2'-amino Cytidine

Table 44

Table 44: Group Designation and Dosage levels for HBV transgenic mouse study

Group	Compound	Dose	Number of Mice	Duration of Treatment
1	RPI.18341 (site 273)	100 mg/kg/day*	10F	14 days
2	RPI.18371 (site 1833)	100 mg/kg/day*	10F	14 days
3	RPI.18418 (site 1873)	100 mg/kg/day*	10F	14 days
4	RPI.18372 (site 1874)	100 mg/kg/day*	10F	14 days
5	Saline control	100 mg/kg/day*	10F	14 days
6	Untreated		10F	0 days

*administered via sc infusion using Alzet mini-osmotic pumps

Table 45

TABLE 45. NUCLEOSIDES USED FOR CHEMICAL SYNTHESIS OF MODIFIED NUCLEOTIDE TRIPHOSPHATES

	NUCLEOSIDES	Abbreviation	CHEMICAL STRUCTURE
1	2'-O-methyl-2,6-diaminopurine riboside	2'-O-Me-DAP	
2	2'-deoxy-2'-amino-2,6-diaminopurine riboside	2'-NH ₂ -DAP	
3	2'-(N-alanyl)amino-2'-deoxy-uridine	ala-2'-NH ₂ U	
4	2'-(N-phenylalanyl)amino-2'-deoxy-uridine	phe-2'-NH ₂ U	
5	2'-(N-β-alanyl) amino-2'-deoxy uridine	2'-β-Ala-NH ₂ -U	

Table 45

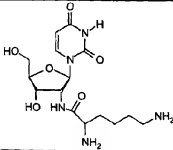
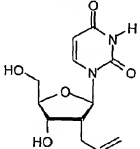
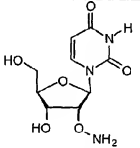
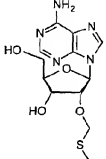
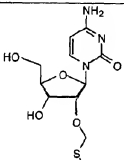
6	2'-Deoxy-2'-(lysiyl) amino uridine	2'-L-lys-NH ₂ -U	
7	2'-C-allyl uridine	2'-C-allyl-U	
8	2'-O-amino-uridine	2'-O-NH ₂ -U	
9	2'-O-methylthiomethyl adenosine	2'-O-MTM-A	
10	2'-O-methylthiomethyl cytidine	2'-O-MTM-C	

Table 45

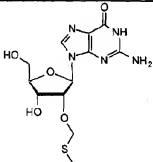
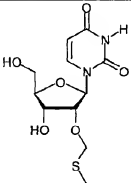
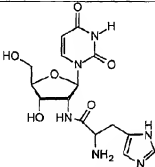
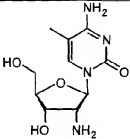
11	2'-O-methylthiomethyl guanosine	2'-O-MTM-G	
12	2'-O-methylthiomethyl- uridine	2'-O-MTM-U	
13	2'-(N-histidyl) amino uridine	2'-his-NH-U	
14	2'-Deoxy-2'-amino-5- methyl cytidine	5-Me-2'-NH2-C	

Table 45

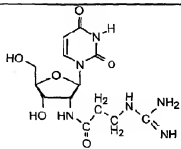
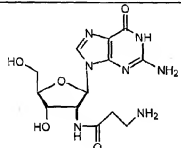
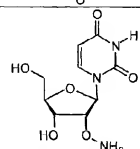
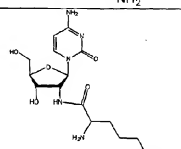
15	2'-(N-β-carboxamide-β-alanyl)amino-2'-deoxy-uridine	β-ala-CA-NH ₂ -U	
16	2'-(N-β-alanyl) guanosine	β-Ala-NH ₂ -G	
17	2'-O-Amino-Uridine	2'-O-NH ₂ -U	
18	2'-(N-lysyl)amino deoxy-cytidine	2'-NH ₂ -lys-C	

Table 45

19	2'-Deoxy histidine) Cytidine	-2'-(L- amino	2'-NH ₂ -his-C	
20	5-Imidazoleacetic acid 2'-deoxy uridine		5-IAA-U	
21	5-[3-(N-4- imidazoleacetyl)amino propynyl]-2'-O-methyl uridine		5-IAA- propynylamino- 2'-OMe U	
22	5-(3-aminopropynyl)- 2'-O-methyl uridine		5-aminopropynyl- 2'-OMe U	
23	5-[3-aminopropyl]-2'- O-methyl uridine		5-aminopropyl- 2'-OMe U	
24	5-[3-(N-4- imidazoleacetyl)amino propyl]-2'-O-methyl Uridine		5-IAA- propylamino-2'- OMe U	

Table 45

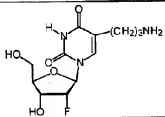
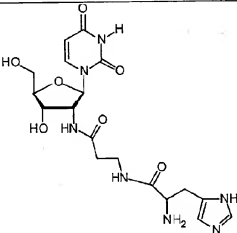
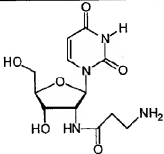
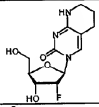
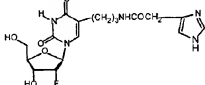
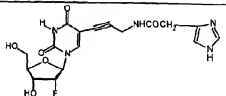
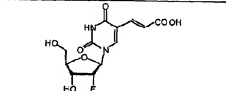
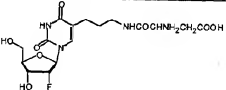
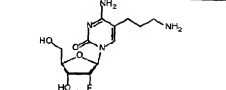
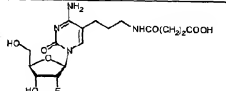
25	5-(3-aminopropyl)-2'-deoxy-2-fluoro uridine	5-aminopropyl-2'-F dU	
26	2'-Deoxy-2'-(β-alanyl-L-histidyl)amino Uridine	2'-amino-β-ALA-HIS dU	
27	2'-deoxy-2'-β-alaninamido-uridine	2'-β-ALA dU	
28	3-(2'-deoxy-2'-fluoro-β-D-ribofuranosyl)piperazin o[2,3-D]pyrimidine-2-one	2'-F piperazino-pyrimidinone	
29	5-[3-(N-4-imidazoleacetyl)amino propyl]-2'-deoxy-2'-fluoro Uridine	5-IAA-propylamino-2'-F dU	

Table 45

30	5-[3-(N-4-imidazoleacetyl)amino propynyl]-2'-deoxy-2'-fluoro uridine	5-IAA-propynylamino-2'-F dU	
31	5-E-[2 carboxyvinyl]-2'-deoxy-2'-fluoro uridine	5-carboxyvinyl-2'-F dU	
32	5-[3-(N-4-aspartyl)aminopropynyl]-2'-fluoro uridine	5-ASP-aminopropyl-2'-F-dU	
33	5-(3-aminopropyl)-2'-deoxy-2'-fluoro cytosine	5-aminopropyl-2'-F dC	
34	5-[3-(N-4-succinyl)aminopropyl]-2'-deoxy-2'-fluoro cytidine	5-succinylamino-propyl-2'-F dC	

605
Table 46**Table 46: PHOSPHORYLATION OF URIDINE IN THE PRESENCE OF DMAP**

0 equiv. DMAP		0.2 equiv. DMAP		0.5 equiv. DMAP		1.0 equiv. DMAP	
Time (min)	Product %	Time (min)	Product %	Time (min)	Product %	Time (min)	Product %
0	1	0	0	0	0	0	0
40	7	10	8	20	27	30	74
80	10	50	24	60	46	70	77
120	12	90	33	100	57	110	84
160	14	130	39	140	63	150	83
200	17	170	43	180	63	190	84
240	19	210	47	220	64	230	77
320	20	250	48	260	68	270	79
1130	48	290	49	300	64	310	77
1200	46	1140	68	1150	76	1160	72
		1210	69	1220	76	1230	74

Table 47

Table 47: Detailed Description of the NTP Incorporation Reaction Conditions

Condition No.	TRIS-HCL (mM)	MgCl ₂ (mM)	DTT (mM)	Spermidine (mM)	Triton X-100 (%)	METHANOL (%)	LiCl (mM)	PEG (%)	Temp(°C)
1	40 (pH 8.0)	20	10	5	0.01	10	1	-	25
2	40 (pH 8.0)	20	10	5	0.01	10	1	4	25
3	40 (pH 8.1)	12	5	1	0.002	-	-	4	25
4	40 (pH 8.1)	12	5	1	0.002	10	-	4	25
5	40 (pH 8.1)	12	5	1	0.002	-	1	4	25
6	40 (pH 8.1)	12	5	1	0.002	10	1	4	25
7	40 (pH 8.0)	20	10	5	0.01	10	1	-	37
8	40 (pH 8.0)	20	10	5	0.01	10	1	4	37
9	40 (pH 8.1)	12	5	1	0.002	-	-	4	37
10	40 (pH 8.1)	12	5	1	0.002	10	-	4	37
11	40 (pH 8.1)	12	5	1	0.002	-	1	4	37
12	40 (pH 8.1)	12	5	1	0.002	10	1	4	37

Table 48

Table 48: INCORPORATION OF MODIFIED NUCLEOTIDE TRIPHOSPHATES

Modification	COND# 1	COND# 2	COND# 3	COND# 4	COND# 5	COND# 6	COND# 7	COND# 8	COND# 9	COND# 10	COND# 11	COND# 12
2'-NH ₂ -ATP	11	37	45	64	25	70	26	54	202	264	109	244
2'-NH ₂ -CTP	4	7	6	14	5	17	3	16	10	21	9	16
2'-NH ₂ -GTP	14	45	4	100	85	82	48	88	20	418	429	440
2'-NH ₂ -UTP	9	3	19	23	9	24	6	3	84	70	28	51
2'-dATP	1	10	43	46	35	47	27	127	204	212	230	235
2'-dCTP	6	10	9	15	9	12	8	34	38	122	31	46
2'-dGTP	9	9	14	18	13	18	8	15	116	114	59	130
2'-dTTP	0	0	0	0	0	0	1	1	2	2	2	2
2'-O-Me-ATP	no data compared to ribo, incorporates at low level											
2'-O-Me-CTP	4	3	4	4	4	4	2	4	4	5	4	5
2'-O-Me-GTP	55	52	39	38	41	48	55	71	93	103	81	77
2'-O-Me-UTP	4	4	3	4	4	5	4	3	4	5	5	5
2'-NH ₂ -DAP	0	0	1	1	1	1	1	0	0	0	0	0
ala-2'-NH ₂ -UTP	2	2	2	2	3	4	14	18	15	20	13	14
phe-2'-NH ₂ -UTP	8	12	7	7	8	8	4	10	6	6	10	6
2'-β-NH ₂ -ala-UTP	65	48	25	17	21	21	220	223	285	300	275	248
2'-F-C5-carboxyvinyl UTP									100			
2'-F-C5-aspartyl-									100			

Table 49

**Table 49: INCORPORATION OF MODIFIED NUCLEOTIDE TRIPHOSPHATES
USING WILD TYPE BACTERIOPHAGE T7 POLYMERASE**

Modification	label	% ribo control
2'-NH ₂ -GTP	ATP	4%
2'-dGTP	ATP	3%
2'-O-Me-GTP	ATP	3%
2'-F-GTP	ATP	4%
2'-O-MTM-GTP	ATP	3%
2'-NH ₂ -UTP	ATP	39%
2'-dTTP	ATP	5%
2'-O-Me-UTP	ATP	3%
ala-2'-NH ₂ -UTP	ATP	0%
phe-2'-NH ₂ -UTP	ATP	1%
2'-β-ala-NH ₂ -UTP	ATP	3%
2'-C-allyl-UTP	ATP	0%
2'-O-NH ₂ -UTP	ATP	1%
2'-O-MTM-UTP	ATP	64%
2'-NH ₂ -ATP	GTP	1%
2'-O-MTM-ATP	GTP	1%
2'-NH ₂ -CTP	GTP	59%
2'-dCTP	GTP	40%
2'-F-CTP	GTP	100%
2'-F-UTP	GTP	100%
2'-F-TTP	GTP	0%
2'-F-C5-carboxyvinyl UTP	GTP	100%
2'-F-C5-aspartyl-aminopropyl UTP	GTP	100%
2'-F-C5-propylamine CTP	GTP	100%
2'-O-Me CTP	GTP	0%
2'-O-Me UTP	GTP	0%
2'-O-Me 5-3-aminopropyl UTP	GTP	0%
2'-O-Me 5-3-aminopropyl UTP	GTP	0%

Table 50

Table 50 a: Incorporation of 2'-his-UTP and Modified CTP's

modification	2'-his-UTP	rUTP
CTP	16.1	100
2'-amino-CTP	9.5*	232.7
2'-deoxy-CTP	9.6*	130.1
2'-OMe-CTP	1.9	6.2
2'-MTM-CTP	5.9	5.1
control	1.2	

Table 50 b: Incorporation of 2'-his-UTP, 2-amino CTP, and Modified ATP's

modification	2'-his-UTP and 2'-amino-CTP	rUTP and rCTP
ATP	15.7	100
2'-amino-ATP	2.4	28.9
2'-deoxy-ATP	2.3	146.3
2'-OMe-ATP	2.7	15
2'-F-ATP	4	222.6
2'-MTM-ATP	4.7	15.3
2'-OMe-DAP	1.9	5.7
2'-amino-DAP	8.9*	9.6

Numbers shown are a percentage of incorporation compared to the all-RNA control

* -Bold number indicates best observed rate of modified nucleotide triphosphate incorporation

Table 51

Table 51: INCORPORATION OF 2'-his-UTP, 2'-NH₂-CTP, 2'-NH₂-DAP, and rGTP USING VARIOUS REACTION CONDITIONS

Conditions	compared to all rNTP
7	8.7*
8	7*
9	2.3
10	2.7
11	1.6
12	2.5

Numbers shown are a percentage of incorporation compared to the all-RNA control

* Two highest levels of incorporation contained both methanol and LiCl

Table 52

Table 52: Selection of Oligonucleotides with Ribozyme Activity

pool	Generation	time	substrate remaining(%)	time	Substrate remaining (%)
N60	0	4 hr	100.00	24 hr	100.00
N60	14	4 hr	99.67	24 hr	97.51
N60	15	4 hr	98.76	24 hr	96.76
N60	16	4 hr	97.09	24 hr	96.60
N60	11	4 hr	79.50	24 hr	64.01
N40	0	4 hr	99.89	24 hr	96.76
N40	10	4 hr	99.74	24 hr	99.42
N40	11	4 hr	97.18	24 hr	90.38
N40	12	4 hr	61.64	24 hr	44.54
N40	13	4 hr	54.28	24 hr	36.46
N20	0	4 hr	99.18	24 hr	100.00
N20	11	4 hr	100.00	24 hr	100.00
N20	12	4 hr	99.51	24 hr	100.00
N20	13	4 hr	90.63	24 hr	84.89
N20	11	4 hr	91.16	24 hr	85.92
N60B	0	4 hr	100.00	24 hr	100.00
N60B	1	4 hr	100.00	24 hr	100.00
N60B	2	4 hr	100.00	24 hr	100.00
N60B	3	4 hr	100.00	24 hr	100.00
N60B	4	4 hr	99.24	24 hr	100.00
N60B	5	4 hr	97.81	24 hr	96.65
N60B	6	4 hr	89.95	24 hr	77.14

Table 53

Table 53: Kinetic Activity of Combinatorial Libraries

Pool	Generation	k_{obs} (min ⁻¹)
N60	14	0.0372
	18	0.0953
	19	0.0827
N40	12	0.0474
	13	0.037
	14	0.065
	15	0.0254
N20	19	0.0359
	14	0.0597
	15	0.0549
	16	0.0477
N60B	6	0.0209
	7	0.0715
	8	0.0379

Table 54

Table 54: Kinetic Activity of Clones within N60 and N40 Combinatorial Libraries

clone	library	activity(min ⁻¹)	k _{rel}
G18	N60	0.00226	1.00
0-2	N60	0.0389	17.21
0-3	N60	0.000609	0.27
0-5	N60	0.000673	0.30
0-7	N60	0.00104	0.46
0-8	N60	0.000739	0.33
0-11	N60	0.0106	4.69
0-12	N60	0.00224	0.99
0-13	N60	0.0255	11.28
0-14	N60	0.000878	0.39
0-15	N60	0.000686	0.03
0-21	N60	0.0106	4.82
0-22	N60	0.000835	0.37
0-24	N60	0.000854	0.29
0-26	N40	0.000741	0.33
0-35	N40	0.00658	2.91
3-1	N40	0.0264	11.68
3-3	N40	0.000451	0.20
3-7	N40	0.000854	0.38
3-15	N40	0.000832	0.37

Table 55

Table 55: Effect of Magnesium Concentration of the Cleavage Rate of N20

[Mg ⁺⁺]	k _{obs} (min ⁻¹)
25	0.0259
20	0.0223
15	0.0182
10	0.0208
5	0.0121
2	0.00319
2	0.00226

Table 56

Enzymatic Nucleic Acid Motifs Targeting HCV

	Seq ID	Alias	Sequence	Rz Seq ID
TUC	1	HCV, R1A-6 Amb, Rz-10/5	ggagugucg gaggaataacuc	19
30U	2	HCV, R1A-56 Amb, Rz-10/5	acgcunucuc gaggaataacuc	39
30U	3	HCV, R1A-75 Amb, Rz-10/5	auacuacgc gaggaataacuc	40
30U	4	HCV, R1A-76 Amb, Rz-10/5	cauacuacgc gaggaataacuc	41
30U	5	HCV, R1A-95 Amb, Rz-10/5	cugagagcuc gaggaataacuc	42
30U	6	HCV, R1A-138 Amb, Rz-10/5	acgcgucuc gaggaataacuc	43
30U	7	HCV, R1A-146 Amb, Rz-10/5	guacuacgc gaggaataacuc	44
30U	8	HCV, R1A-158 Amb, Rz-10/5	cugcauuc gaggaataacuc	45
30U	9	HCV, R1A-164 Amb, Rz-10/5	cugcucuc gaggaataacuc	46
30U	10	HCV, R1A-176 Amb, Rz-10/5	agaaagcac gaggaataacuc	47
30U	11	HCV, R1A-177 Amb, Rz-10/5	agaaagcac gaggaataacuc	48
30U	12	HCV, R1A-209 Amb, Rz-10/5	cccauuc gaggaataacuc	49
30U	13	HCV, R1A-237 Amb, Rz-10/5	acugcuc gaggaataacuc	50
30U	14	HCV, R1A-254 Amb, Rz-10/5	uucgcgc gaggaataacuc	51
30U	15	HCV, R1A-255 Amb, Rz-10/5	cuucgcgc gaggaataacuc	52
30U	16	HCV, R1A-259 Amb, Rz-10/5	agcgcuc gaggaataacuc	53
30U	17	HCV, R1A-266 Amb, Rz-10/5	uaccacagc gaggaataacuc	54
30U	18	HCV, R1A-273 Amb, Rz-10/5	cagcagc gaggaataacuc	55
30U	19	HCV, R1A-288 Amb, Rz-10/5	ucgcagc gaggaataacuc	56
30U	20	HCV, R1A-291 Amb, Rz-10/5	cacgcgc gaggaataacuc	57
30U	21	HCV, R1A-7 Amb, Rz-10/5	uugaguc gaggaataacuc	58
30U	22	HCV, R1A-119 Amb, Rz-10/5	uugaguc gaggaataacuc	59
30U	23	HCV, R1A-120 Amb, Rz-10/5	uugaguc gaggaataacuc	60
30U	24	HCV, R1A-133 Amb, Rz-10/5	uugaguc gaggaataacuc	61
30U	25	HCV, R1A-140 Amb, Rz-10/5	uugaguc gaggaataacuc	62
30U	26	HCV, R1A-188 Amb, Rz-10/5	uugaguc gaggaataacuc	63
30U	27	HCV, R1A-198 Amb, Rz-10/5	uugaguc gaggaataacuc	64
30U	28	HCV, R1A-205 Amb, Rz-10/5	uugaguc gaggaataacuc	65
30U	29	HCV, R1A-217 Amb, Rz-10/5	uugaguc gaggaataacuc	66
30U	30	HCV, R1A-218 Amb, Rz-10/5	uugaguc gaggaataacuc	67
30U	31	HCV, R1A-219 Amb, Rz-10/5	uugaguc gaggaataacuc	68
30U	32	HCV, R1A-223 Amb, Rz-10/5	uugaguc gaggaataacuc	69
30U	33	HCV, R1A-229 Amb, Rz-10/5	uugaguc gaggaataacuc	70
30U	34	HCV, R1A-279 Amb, Rz-10/5	uugaguc gaggaataacuc	71
30U	35	HCV, R1A-279 Amb, Rz-10/5	uugaguc gaggaataacuc	72

Table 56

295	UGCUGGCGAGUCCCC	35	HCV, R1A-295 Amb. Rz-10/5	ggggcacucg Gaggaaacuc C UGAAGGACAUCCUCCGG aagca B	73
301	CGAGUGCCCGGAGG	36	HCV, R1A-301 Amb. Rz-10/5	ccuccgggg Gaggaaacuc C UGAAGGACAUCCUCCGG acucg B	74
306	GCCCGGAGCUCUCG	37	HCV, R1A-306 Amb. Rz-10/5	cgagaccuc Gaggaaacuc C UGAAGGACAUCCUCCGG ggggc B	75
307	CCCGGAGGUCUCGU	38	HCV, R1A-307 Amb. Rz-10/5	acgagaccuc Gaggaaacuc C UGAAGGACAUCCUCCGG cgggc B	76
No				Ggaacgugugcaac cggagucaucauauggcuuc C UUCaaggGcUUGcGg	
Ribo				ggacgc B	
Ribo				ggaagggggtgcacccggaucUUCUAUAUUGGUCUUCUUAAGGACAUCCUCCGG	
				AGGCGC B	

lower case = 2'-O-methyl

U, C = 2'-deoxy-2'-amino U, = 2'-deoxy-2'-amino C

G,A = ribo G, A

B = inverted deoxybasic

Table 57

Table 57. Additional Class II enzymatic nucleic acid Motifs

Class II Motif ID	Sequence	Seq ID No.	Kinetic Rate
A2	GGGAGGAGGAAGUGCCUGGUCAGUCACACCGAGACUGGCAGACGCUGAAACC GCCGCGGUCGCUCCAGUCC	77	UNK
A12	GGGAGGAGGAAGUGCCUGGUCAGUAAUUAUAAUCGUUACUACGAGUGCAAGGUC GCCGCGGUCGCUCCAGUCC	78	UNK
A11	GGGAGGAGGAAGUGCCUGGUCAGUAGUUGGCCGAACTUGUGACUACGAGUGAGGUC GCCGCGGUCGCUCCAGUCC	79	UNK
B14	GGGAGGAGGAAGUGCCUGGCGAUCAGAUAGAUAGUAGGCGACGCGAGAGACC GCCGCGGUCGCUCCAGUCC	80	UNK
B10	GGGAGGAGGAAGUGCCUGGCGACUGAUACGAAAAGUCGCAGUUCGAAACC GCCGCGGUCGCUCCAGUCC	81	UNK
B21	GGGAGGAGGAAGUGCCUGGCGACUGAUACGAAAAGUCGCAGUUCGAAACC GCCGCGGUCGCUCCAGUCC	82	UNK
B7	GGGAGGAGGAAGUGCCUGGCGACUGAUAGUGAGCAGAUUGCGACACC GCCGCGGUCGCUCCAGUCC	83	UNK
C8	GGGAGGAGGAAGUGCCUGGUCAUUAGGAUGACAAACGUUACUGAACACU GCCGCGGUCGCUCCAGUCC	84	0.01 MIN ⁻¹

Table 58: Human Her2 Class II Ribozyme and Target Sequen

RPI#	HTPos	Substrate	Seq ID	Ribozyme Alias	Ribozyme Sequence	Seq ID
18722	349	CAGGAG G CAGGCG	85	etRB2-180 21n.Rz-6	antiso etabl	194
18815	284	GAGCGG G CAGGCG	86	etRB2-184 21n.Rz-6	antiso etabl	195
18828	276	AGCGGCG G CAGGCG	87	etRB2-276 21n.Rz-7	antiso etabl	196
18853	314	UGCGCC G CAGCG	88	etRB2-314 21n.Rz-6	antiso etabl	197
18825	314	AUGCGCC G CAGCG	89	etRB2-314 21n.Rz-7	antiso etabl	198
18831	379	ACGCAU G CAGCG	90	etRB2-379 21n.Rz-6	antiso etabl	199
18660	433	GCGCAU G CAGCG	91	etRB2-433 21n.Rz-7	antiso etabl	200
18711	594	GCGCGG G CAGCG	92	etRB2-594 21n.Rz-6	antiso etabl	201
18661	594	GCGCGG G CAGCG	93	etRB2-594 21n.Rz-7	antiso etabl	202
18697	597	GCGCA G CAGCG	94	etRB2-597 21n.Rz-6	antiso etabl	203
18665	597	AGCGCG G CAGCG	95	etRB2-597 21n.Rz-7	antiso etabl	204
18712	659	AGCGCG G CAGCG	96	etRB2-659 21n.Rz-6	antiso etabl	205
18662	659	CAGCGG G CAGCG	97	etRB2-659 21n.Rz-7	antiso etabl	206
18663	678	CAGCGG G CAGCG	98	etRB2-678 21n.Rz-6	antiso etabl	207
18654	678	ACGCAU G CAGCG	99	etRB2-678 21n.Rz-7	antiso etabl	208
18665	881	ACGCAU G CAGCG	100	etRB2-881 21n.Rz-6	antiso etabl	209
18664	881	GAGCGG G CAGCG	101	etRB2-881 21n.Rz-7	antiso etabl	210
18723	888	GCGCGG G CAGCG	102	etRB2-888 21n.Rz-6	antiso etabl	211
18696	929	CAGCGG G CAGCG	103	etRB2-929 21n.Rz-6	antiso etabl	212
18648	929	UGCGCG G CAGCG	104	etRB2-929 21n.Rz-7	antiso etabl	213
18666	934	UGCGCG G CAGCG	105	etRB2-934 21n.Rz-6	antiso etabl	214
18621	934	CAGCGG G CAGCG	106	etRB2-934 21n.Rz-7	antiso etabl	215
18695	938	UGCGCG G CAGCG	107	etRB2-938 21n.Rz-6	antiso etabl	216
18649	938	CAGCGG G CAGCG	108	etRB2-938 21n.Rz-7	antiso etabl	217
18667	969	CAGCGG G CAGCG	109	etRB2-969 21n.Rz-6	antiso etabl	218
18668	969	UGCGCG G CAGCG	110	etRB2-969 21n.Rz-7	antiso etabl	219
18656	972	UGCGCG G CAGCG	111	etRB2-972 21n.Rz-6	antiso etabl	220
18657	972	UGCGCG G CAGCG	112	etRB2-972 21n.Rz-7	antiso etabl	221
18234	972	UGCGCG G CAGCG		etRB2-972 21n.Rz-6	antiso etabl	222

Table 58

19235	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	223
19253	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	224
19292	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	225
19296	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	226
19277	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	227
19778	972	er1882-972	Zin.Rz-6	amino stabi	9,6-C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	228
18659	1199	er1882-1199	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	229
18658	1199	er1882-1199	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	230
18724	1205	er1882-1205	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	231
18659	1205	er1882-1205	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	232
18725	1211	er1882-1211	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	233
18726	1292	er1882-1292	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	234
18658	1292	er1882-1292	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	235
18727	1313	er1882-1313	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	236
18659	1397	er1882-1397	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	237
18728	1414	er1882-1414	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	238
18670	1414	er1882-1414	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	239
18671	1536	er1882-1536	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	240
18687	1541	er1882-1541	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	241
18629	1562	er1882-1562	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	242
18810	1626	er1882-1626	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	243
18700	1755	er1882-1755	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	244
18672	1755	er1882-1755	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	245
18688	1757	er1882-1757	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	246
18659	1759	er1882-1759	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	247
18670	1759	er1882-1759	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	248
18701	1784	er1882-1784	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	249
18673	1784	er1882-1784	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	250
18691	2063	er1882-2063	Zin.Rz-6	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	251
18661	2063	er1882-2063	Zin.Rz-7	amino stabi	C ₆ H ₅ -C ₆ H ₄ SH	OCygnasaagōdōmōkaasōdō, agnusa B	252
							253

Table 58

[illegible]

UPPER CASE = RIBO

Lower case = 2'-O-methyl

C = 2'-deoxy-2'-amino Cytidine

s = phosphorothioate

B = inverted deoxyabasic

Table 59

Table 59: Human HER2 Class II (zinyne) Ribozyme and Target Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
46	GGCGAGCC G CGCGCCC	310	GGGCGCG GCGAAAAGCGAGUCAAGGUCU	895
48	GCAGCCGC G CGCCCUUC	311	AAGGGCG GCGAAAAGCGAGUCAAGGUCU	896
50	AGCCGCGC G CCCCUCU	312	GGAGGCG GCGAAAAGCGAGUCAAGGUCU	897
75	CCUUUACU G CGCGCGC	313	GCDCGCG GCGAAAAGCGAGUCAAGGUCU	898
77	UUUACUG G CGCGCGC	314	GCDCGCG GCGAAAAGCGAGUCAAGGUCU	899
80	ACUGCGCC G CGCGCCG	315	CGGCGCG GCGAAAAGCGAGUCAAGGUCU	900
82	UGCGCGC G CGCCGCG	316	GCDCGCG GCGAAAAGCGAGUCAAGGUCU	901
84	CGCCGCGC G CCGCGCC	317	GGGCGCG GCGAAAAGCGAGUCAAGGUCU	902
102	CACCCUUC G CAGCACCC	318	GGUGUCU GCGAAAAGCGAGUCAAGGUCU	903
112	AGCACCCC G CGCCCGC	319	CGGCGCG GCGAAAAGCGAGUCAAGGUCU	904
114	CACCCGCG G CGCGCGC	320	CGGCGCG GCGAAAAGCGAGUCAAGGUCU	905
119	CGCGCCCC G CCCCUCU	321	GGAGGCG GCGAAAAGCGAGUCAAGGUCU	906
121	CGCCCGCG G CCCCUGA	322	UGGAGCG GCGAAAAGCGAGUCAAGGUCU	907
163	CCGAGGCC G CAGUGAGC	323	GCUCACU GCGAAAAGCGAGUCAAGGUCU	908
194	GGCCUUGU G CCGUGGG	324	CCGAGCG GCGAAAAGCGAGUCAAGGUCU	909
197	CUUGUGCC G CUGGGGCG	325	GCCCCAG GCGAAAAGCGAGUCAAGGUCU	910
214	UCCUCUUC G CCCCUCU	326	CAGGAGC GCGAAAAGCGAGUCAAGGUCU	911
222	CGCCUUCU G CCCCCCG	327	CGGCGCG GCGAAAAGCGAGUCAAGGUCU	912
235	CCGAGGCC G CAGCACCC	328	GGUGUCU GCGAAAAGCGAGUCAAGGUCU	913
251	CCAGAGUG G CACCGGCA	329	UGCCGCG GCGAAAAGCGAGUCAAGGUCU	914
273	AUGAAGCU G CGGCUCCC	330	GGAGCGC GCGAAAAGCGAGUCAAGGUCU	915
283	GGCUCCCU G CCAUCCC	331	GGACUCU GCGAAAAGCGAGUCAAGGUCU	916
309	CUAGACAU G CUCCGCCA	332	UGGCGAG GCGAAAAGCGAGUCAAGGUCU	917
314	CAUGCUCU G CCACUCU	333	AGAUGUG GCGAAAAGCGAGUCAAGGUCU	918
332	CCAGGUCU G CCAGUUGU	334	CCACUCU GCGAAAAGCGAGUCAAGGUCU	919
342	CAGGUGGU G CAGGAGAA	335	UUUCCCU GCGAAAAGCGAGUCAAGGUCU	920
369	ACCUCACU G CCCACCA	336	UUGUGGG GCGAAAAGCGAGUCAAGGUCU	921
379	CCACCAAU G CCAGCCU	337	CAGGUCU GCGAAAAGCGAGUCAAGGUCU	922
396	UCCUCCCU G CAGGAUUA	338	AUAUCCU GCGAAAAGCGAGUCAAGGUCU	923
414	CAGAGAGU G CAGGCUCA	339	UAGCCCU GCGAAAAGCGAGUCAAGGUCU	924
426	GGCUACU G CUAUCGC	340	CGAUAGC GCGAAAAGCGAGUCAAGGUCU	925
433	UGUCUAUC G CUCACAAC	341	GUUGAGC GCGAAAAGCGAGUCAAGGUCU	926
462	GUCCCAUC G CAGAGGCU	342	AGCCUCU GCGAAAAGCGAGUCAAGGUCU	927
471	CAGAGGCU G CGGUUUGU	343	ACAUCUC GCGAAAAGCGAGUCAAGGUCU	928
480	CGAUUUGU G CAGGGCAC	344	GUCCUCU GCGAAAAGCGAGUCAAGGUCU	929
511	ACAACUUA G CCCCUGCC	345	GGCCAGG GCGAAAAGCGAGUCAAGGUCU	930
522	CUGGCCGU G CUAGACA	346	UUUGUAG GCGAAAAGCGAGUCAAGGUCU	931
540	GGAGACCC G CUGAGCAA	347	UUUGUAG GCGAAAAGCGAGUCAAGGUCU	932
585	GGAGGCCU G CGGAGCU	348	AGUCUCC GCGAAAAGCGAGUCAAGGUCU	933
594	CGGAGCU G CAGCUUCG	349	CGAAGCU GCGAAAAGCGAGUCAAGGUCU	934
659	CCAGUCU G CUACGAGG	350	CCUGUAG GCGAAAAGCGAGUCAAGGUCU	935
737	CACCAACC G CUCUCGGG	351	CCGAGAG GCGAAAAGCGAGUCAAGGUCU	936
749	UCGCGCCU G CCAACCCU	352	AGGGUGG GCGAAAAGCGAGUCAAGGUCU	937

Table 59

762	GGGCUCCC	G	CUGCUGGG	353	CCGAGCAG	GCCGAAAGGCGAGUCAAGGUCU	GGGAGCCC	938
765	CUCCCGCU	G	CUGGGGAG	354	CUCCCGAG	GCCGAAAGGCGAGUCAAGGUCU	AGCGGGAG	939
822	AGCCUGAC	G	CGCAGUCU	355	ACAGUGCG	GCCGAAAGGCGAGUCAAGGUCU	GUCAAGUC	940
824	CCUGACAG	G	CACUGUCU	356	AGACAGUG	GCCGAAAGGCGAGUCAAGGUCU	GCGUCAGG	941
835	CUGUCUGU	G	CCGUGGCG	357	GCCACCGG	GCCGAAAGGCGAGUCAAGGUCU	ACAGACAG	942
847	GUGGCUUG	G	CCCGCUGC	358	GCCAGCGG	GCCGAAAGGCGAGUCAAGGUCU	ACAGCCAC	943
851	CUGUGCCC	G	CUGCAAAG	359	CCUUGCAG	GCCGAAAGGCGAGUCAAGGUCU	GCGCACAG	944
854	UGCCCGCU	G	CAAGGGGC	360	GCCCCUUG	GCCGAAAGGCGAGUCAAGGUCU	AGCGGGCA	945
867	GGCCACCU	G	CCACUGA	361	UCAGUGGG	GCCGAAAGGCGAGUCAAGGUCU	AGUGGGCC	946
878	CACUCACU	G	CUGCCAGC	362	CAUGGCGG	GCCGAAAGGCGAGUCAAGGUCU	AGUCAGUG	947
881	UGACUGCU	G	CCAUAGAG	363	CCUUCAGG	GCCGAAAGGCGAGUCAAGGUCU	AGCAGUCA	948
895	AGCAGUGU	G	CUGCCGGC	364	GCCCGCAG	GCCGAAAGGCGAGUCAAGGUCU	ACAUCUGU	949
898	AGUGUGCU	G	CCGCGUGC	365	GCCAGCGG	GCCGAAAGGCGAGUCAAGGUCU	AGCACACU	950
905	UGCCGGCU	G	CACGGGCG	366	GCCCCUUG	GCCGAAAGGCGAGUCAAGGUCU	AGCGGGCA	951
929	CUCUGACU	G	CCUGGCGU	367	AGCCAGCG	GCCGAAAGGCGAGUCAAGGUCU	AGUCAGAG	952
938	CCUGGCUU	G	CCUCCACU	368	AGUGGAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGCGCAG	953
972	UGUGAGCU	G	CACUGCCC	369	GGCAGUGG	GCCGAAAGGCGAGUCAAGGUCU	AGCUCACA	954
977	GUGGACAU	G	CCGAGCCC	370	GGCUGGCG	GCCGAAAGGCGAGUCAAGGUCU	AGUGCAGC	955
1020	CACUCACU	G	CCCAUCC	371	GGAUUGGG	GCCGAAAGGCGAGUCAAGGUCU	AUGGACUC	956
1051	CAUUGCGC	G	CCAGCUGU	372	ACAGCUGG	GCCGAAAGGCGAGUCAAGGUCU	GCCGAUUG	957
1066	GUGUGACU	G	CCUUGCCC	373	GGGACAGG	GCCGAAAGGCGAGUCAAGGUCU	AGUCACAC	958
1106	GGGAUUCU	G	CACCCUUG	374	CAGGGGUG	GCCGAAAGGCGAGUCAAGGUCU	AGGAUCCC	959
1118	CCUUGCUU	G	CCCCUUGC	375	GCCAGGGG	GCCGAAAGGCGAGUCAAGGUCU	AGAAGGAG	960
1125	UGCCCCCU	G	CACAACCA	376	UGGUUGUG	GCCGAAAGGCGAGUCAAGGUCU	AGGGGGCA	961
1175	UGAGAAAG	G	CAGCAAGC	377	GCUUGCUG	GCCGAAAGGCGAGUCAAGGUCU	ACTUUCUA	962
1189	AGCCUCUG	G	CCCGAGUG	378	CACUCGGG	GCCGAAAGGCGAGUCAAGGUCU	ACAGGGCU	963
1199	CCGAGUGU	G	CUAUGGUC	379	GACCAUAG	GCCGAAAGGCGAGUCAAGGUCU	ACAUCGCG	964
1224	GAGCACUU	G	CGAGAGGU	380	ACCCUUCG	GCCGAAAGGCGAGUCAAGGUCU	AAGUGCUC	965
1249	UUAACAGU	G	CCAAUUC	381	GAUUAUUG	GCCGAAAGGCGAGUCAAGGUCU	ACTUGGUA	966
1267	AGGAGUUU	G	CUGGCUUG	382	GCCAGCAG	GCCGAAAGGCGAGUCAAGGUCU	AAAUUCUC	967
1274	UGCUGGCU	G	CAAGAAGA	383	UCUUCUUG	GCCGAAAGGCGAGUCAAGGUCU	AGCAGCAG	968
1305	GCAUUCUG	G	CCGAGAGG	384	CUCUCCGG	GCCGAAAGGCGAGUCAAGGUCU	AGGAAUUC	969
1342	CCAACACU	G	CCCCGCUU	385	GAGCGGGG	GCCGAAAGGCGAGUCAAGGUCU	AGUGUUGG	970
1347	ACUGCCCC	G	CUCCAGCC	386	GGCUGGAG	GCCGAAAGGCGAGUCAAGGUCU	GGGGCAUG	971
1431	GACAGCCU	G	CCUGAGCU	387	AGGUCAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGCUUGC	972
1458	CAGAACCU	G	CAGUAUUA	388	AUUAUCUUG	GCCGAAAGGCGAGUCAAGGUCU	AGGUUCUG	973
1482	CGAAUUCU	G	CACAAGUG	389	CCAUUGUG	GCCGAAAGGCGAGUCAAGGUCU	AGAAUUCG	974
1492	ACAAUUGC	G	CUACUUGG	390	CGAGUAGG	GCCGAAAGGCGAGUCAAGGUCU	GCCAUUGU	975
1500	GCCUACUC	G	CUGAGCCU	391	AGGGUACG	GCCGAAAGGCGAGUCAAGGUCU	GAGUAGCC	976
1509	GACGCCCU	G	CAGGGCGU	392	AGCCCUUG	GCCGAAAGGCGAGUCAAGGUCU	AGGGUACG	977
1539	CUGGGGCU	G	CGUCACAU	393	AGUGAGCG	GCCGAAAGGCGAGUCAAGGUCU	AGCCCCAG	978
1541	GGGGCUGC	G	CUCUCUGA	394	UCAGUGAG	GCCGAAAGGCGAGUCAAGGUCU	GCAAGCCC	979
1598	CCACCCUG	G	CUUUGGCG	395	GACGAGAG	GCCGAAAGGCGAGUCAAGGUCU	AGAGGUGG	980
1605	UGUUCUGU	G	CACACGGU	396	ACCGUGUG	GCCGAAAGGCGAGUCAAGGUCU	ACGAAGCA	981
1614	CACACGUG	G	CCUUGGGA	397	UCCCAAGG	GCCGAAAGGCGAGUCAAGGUCU	AGCCUGUG	982
1641	CGGAACCC	G	CAACACAG	398	GCUUUGUG	GCCGAAAGGCGAGUCAAGGUCU	GCGUUCUG	983
1653	CAAGCUCU	G	CUCCACAC	399	GUGUGGAG	GCCGAAAGGCGAGUCAAGGUCU	AGAGCUGU	984

Table 59

1663	UCCACACU G CCAACCGG	400	CCGUGUGG GCCGAAAGGCGAGUCAAGGUCU	AGUGUGGA	985
1706	CUUGGCGU G CCACACAG	401	GCUGUGGG GCCGAAAGGCGAGUCAAGGUCU	AGGCGACG	986
1718	CCAGCUGU G CCGCCGAG	402	CUUGGCGG GCCGAAAGGCGAGUCAAGGUCU	ACAGCUGG	987
1720	AGCUGJGC G CCGAGGGG	403	CCUUCGGG GCCGAAAGGCGAGUCAAGGUCU	GCACAGCU	988
1733	AGGCGACU G CUUGGGUC	404	GACCCGAG GCCGAAAGGCGAGUCAAGGUCU	AGUGCCCU	989
1766	UGUCACU G CAGCCAGU	405	ACUGGCGU GCCGAAAGGCGAGUCAAGGUCU	AGUUGACA	990
1793	CCAGGAGU G CGUGGAGG	406	CCUCCACG GCCGAAAGGCGAGUCAAGGUCU	ACUCCUGG	991
1805	GGAGGAU G CGAGGUAC	407	GUACUCGG GCCGAAAGGCGAGUCAAGGUCU	AUUCUCCG	992
1815	CGAGUACU G CAGGGGCU	408	AGCCCGUG GCCGAAAGGCGAGUCAAGGUCU	AGUACUCG	993
1843	AUGUGAU G CCAGGCAC	409	GUUGCUGG GCCGAAAGGCGAGUCAAGGUCU	AUUCACAU	994
1857	CACUGUUG G CCGUGCCA	410	UGGACCGG GCCGAAAGGCGAGUCAAGGUCU	AAACAGUG	995
1862	UUUGCCGU G CCACCCUG	411	CAGGUGGG GCCGAAAGGCGAGUCAAGGUCU	ACGGCAAA	996
1936	UGGCGUGU G CCACTAUU	412	AUAGUGGG GCCGAAAGGCGAGUCAAGGUCU	ACAGGCCA	997
1961	UCCUUCU G CGUGGCCG	413	GGGCCACG GCCGAAAGGCGAGUCAAGGUCU	AGAAGGGA	998
1970	CGUGGCCG G CUGGCCCA	414	UGGGGCGG GCCGAAAGGCGAGUCAAGGUCU	GGGCCACG	999
1973	GGCCCGCU G CCCCACGG	415	CGCUGGGG GCCGAAAGGCGAGUCAAGGUCU	AGCGGGCC	1000
2007	UCCUACAU G CCAUUCUG	416	CAGAUUGG GCCGAAAGGCGAGUCAAGGUCU	AUGUAGGA	1001
2038	AGGAGGCG G CAUCCAG	417	CUUGGCGU GCCGAAAGGCGAGUCAAGGUCU	GCCUUCU	1002
2042	GGGCGCAU G CGAGCCUU	418	NAUGGUGG GCCGAAAGGCGAGUCAAGGUCU	AUGGCCCC	1003
2051	CCAGCCUU G CCCCACUA	419	UGAUGGGG GCCGAAAGGCGAGUCAAGGUCU	AAGGCUUG	1004
2063	CAUCUACU G CACCCACU	420	AGUGGGUG GCCGAAAGGCGAGUCAAGGUCU	AGUGGAGU	1005
2099	CAGAGGCU G CCGCGCGG	421	CGCGGGGG GCCGAAAGGCGAGUCAAGGUCU	AGCCUUCU	1006
2104	GCUGCCCG G CCGACGAG	422	CUUGCUGG GCCGAAAGGCGAGUCAAGGUCU	GGGGCAGC	1007
2143	UCAUUCU G CCGUGGUG	423	NAUCCCGG GCCGAAAGGCGAGUCAAGGUCU	AGAGAUUA	1008
2160	GGCAUUCU G CUGGUCGU	424	ACGACCAAG GCCGAAAGGCGAGUCAAGGUCU	AGAUUGCC	1009
2235	UACACGAU G CGGAGACU	425	AGUCUCCG GCCGAAAGGCGAGUCAAGGUCU	AUCGUGUA	1010
2244	CGGAGACU G CUGCAGGA	426	UCCUGCAG GCCGAAAGGCGAGUCAAGGUCU	AGUCUCCG	1011
2247	AGACUUCU G CAGGAAAC	427	GUUUCUUG GCCGAAAGGCGAGUCAAGGUCU	AGCAGUCU	1012
2271	GUGGAGCC G CUGACACC	428	GGUGUACG GCCGAAAGGCGAGUCAAGGUCU	GGCUCAC	1013
2292	GGAGCGAU G CCAACCA	429	UGGUGGGG GCCGAAAGGCGAGUCAAGGUCU	AUCGCUCC	1014
2304	AACCAAGC G CAGAUUGG	430	UCGACUUG GCCGAAAGGCGAGUCAAGGUCU	GCCUGGUA	1015
2310	CGCGAGAU G CAGAUUCU	431	AGGAUCCG GCCGAAAGGCGAGUCAAGGUCU	AUCUGGCG	1016
2349	GUGAAGGU G CUUGGAUC	432	GAUCCAGG GCCGAAAGGCGAGUCAAGGUCU	ACCUUCAC	1017
2362	GAUCUUGG G CUUUGGCG	433	GCCAAAGG GCCGAAAGGCGAGUCAAGGUCU	GCCAGAUU	1018
2525	UGUCUCCC G CCUCUUGG	434	CCGAAAGG GCCGAAAGGCGAGUCAAGGUCU	GGGAGACA	1019
2540	GGGCAUCU G CCUGACAU	435	AUGUCAGG GCCGAAAGGCGAGUCAAGGUCU	AGAUJGCC	1020
2556	UCCACCGU G CAGCUGGU	436	ACGACGUG GCCGAAAGGCGAGUCAAGGUCU	ACCUUGGA	1021
2577	CAGCUTAU G CCAUUGG	437	CCAUAAGG GCCGAAAGGCGAGUCAAGGUCU	AUAAGCUG	1022
2588	CUAUGGCU G CCUCUAG	438	CUAAGAGG GCCGAAAGGCGAGUCAAGGUCU	AGCCAUAG	1023
2615	GGAAAAAC G CGGACGCC	439	GGCUGCCG GCCGAAAGGCGAGUCAAGGUCU	GGUUAUCC	1024
2621	CCGCGGAC G CCUGGCGU	440	AGCCCGAG GCCGAAAGGCGAGUCAAGGUCU	GUUCGCGG	1025
2640	CAGGACCU G CUGAACUG	441	CAGUUCAG GCCGAAAGGCGAGUCAAGGUCU	AGGUCCUG	1026
2655	UGGUGGAU G CAGAUJGC	442	GCAAUUCG GCCGAAAGGCGAGUCAAGGUCU	AUAACACA	1027
2662	UGCAGAUU G CCAAGGGG	443	CCCCTUGG GCCGAAAGGCGAGUCAAGGUCU	AUUCUGCA	1028
2691	GAGGAUGU G CGGCUUCG	444	ACGAGCCG GCCGAAAGGCGAGUCAAGGUCU	ACAUCCUC	1029
2716	ACUUCGCC G CCUGGAAAC	445	GUUCCGAG GCCGAAAGGCGAGUCAAGGUCU	GGCCAAUG	1030
2727	CGGAACGU G CUGGUAAC	446	UUGACCAAG GCCGAAAGGCGAGUCAAGGUCU	ACGUUCCG	1031

Table 59

2781	GCUCGGCU	G	CUGGACAU	447	AUGUCAG	GCCGAAAGGCGAGUCAAGGUCU	AGCCGAGC	1032
2809	AGUACCAU	G	CAGAUGGG	448	CCCAUCUG	GCCGAAAGGCGAGUCAAGGUCU	AUGGUAUC	1033
2826	GGCAGUG	G	CCCAUCNA	449	UGAUGGG	GCCGAAAGGCGAGUCAAGGUCU	ACCUGGCC	1034
2844	UGGAUGGC	G	CUGGAGUC	450	GACUCCAG	GCCGAAAGGCGAGUCAAGGUCU	AGCAUCCA	1035
2861	CAUUCUCC	G	CGGGGUG	451	ACCGCGGG	GCCGAAAGGCGAGUCAAGGUCU	GGAGAAUG	1036
2976	CCUGACCU	G	CUGGAAAA	452	UUUUCAG	GCCGAAAGGCGAGUCAAGGUCU	AGGUCAGG	1037
2997	GACGGGCU	G	CCCAAGCC	453	GGGUGGG	GCCGAAAGGCGAGUCAAGGUCU	AGCCGUCU	1038
3014	CCCAUUCU	G	CAACAUUG	454	CAUUGUG	GCCGAAAGGCGAGUCAAGGUCU	AGAUGGGG	1039
3107	AUUCUCCC	G	CAUGGCCA	455	UGGCCAUG	GCCGAAAGGCGAGUCAAGGUCU	GGGAGAAU	1040
3128	CCCCCAGU	G	CUUUGUGG	456	CCACAAGG	GCCGAAAGGCGAGUCAAGGUCU	GCUGGGGG	1041
3191	CUUCUACC	G	CUCAUUGC	457	GCAGUGAG	GCCGAAAGGCGAGUCAAGGUCU	GGUAGAGG	1042
3198	CGUCACAU	G	CUGGAGGA	458	UCCUCCAG	GCCGAAAGGCGAGUCAAGGUCU	AGUGAGCG	1043
3232	UGGUGGAU	G	CUGAGGAG	459	CUUCUAG	GCCGAAAGGCGAGUCAAGGUCU	AUCCACCA	1044
3280	CAGACCCU	G	CCCCGGGC	460	GCCCGGGG	GCCGAAAGGCGAGUCAAGGUCU	AGGUGUCG	1045
3289	CCCCGGGC	G	CUGGGGGC	461	GCCCCCAG	GCCGAAAGGCGAGUCAAGGUCU	GCCCGGGG	1046
3317	CAGGCACC	G	CAGUCUAC	462	AUGAGCUG	GCCGAAAGGCGAGUCAAGGUCU	GGUGCCUG	1047
3468	AAAGGGCU	G	CAAGACCU	463	AGGCUUUG	GCCGAAAGGCGAGUCAAGGUCU	AGCCCCUJ	1048
3534	GUACCCCU	G	CCUUCUGA	464	UCAGAGGG	GCCGAAAGGCGAGUCAAGGUCU	AGGGGUAC	1049
3559	GAUACGCU	G	CCGCCGUG	465	CAGGGGGG	GCCGAAAGGCGAGUCAAGGUCU	AACGUAGC	1050
3572	CCUGACCU	G	CAGCCCCC	466	GGGGGCGG	GCCGAAAGGCGAGUCAAGGUCU	AGGUCAGG	1051
3627	CCCCUUCU	G	CCCCGAGA	467	UUCUGGGG	GCCGAAAGGCGAGUCAAGGUCU	GAAAGGGG	1052
3645	GGCCUUCU	G	CCUGUCGC	468	GCAACAGG	GCCGAAAGGCGAGUCAAGGUCU	AGAAGGCC	1053
3649	UCUGGCUU	G	CCGCCGGA	469	UCGGGCGG	GCCGAAAGGCGAGUCAAGGUCU	AGGACAGG	1054
3652	UGCCUGCU	G	CCGACCUU	470	AGGUCGGG	GCCGAAAGGCGAGUCAAGGUCU	AGCAGGCA	1055
3661	CCGACCUU	G	CUGGUGCC	471	GGCACAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGUCGGG	1056
3667	CUGCUGGU	G	CCACUCUG	472	CAGAGUGG	GCCGAAAGGCGAGUCAAGGUCU	ACCAGCAG	1057
3730	ACGUUUUU	G	CCUUGGGG	473	CCCAAAGG	GCCGAAAGGCGAGUCAAGGUCU	AAAAACGU	1058
3742	UUGGGGGU	G	CCUGGAGG	474	CUCCACGG	GCCGAAAGGCGAGUCAAGGUCU	ACCCCCAA	1059
3784	GAGGAGCU	G	CCCCUCAG	475	CUGAGGGG	GCCGAAAGGCGAGUCAAGGUCU	AGUCUCCU	1060
3808	CUCCUUCU	G	CCUUCAGC	476	GCUGAAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGAGGAG	1061
3933	CUGGACCU	G	CCAGUGUG	477	CACACUGG	GCCGAAAGGCGAGUCAAGGUCU	ACGUCACG	1062
3960	CCAAUGCC	G	CAGAAGCC	478	GGCUUCUG	GCCGAAAGGCGAGUCAAGGUCU	GGACUUGG	1063
4007	UGACUUCU	G	CUGGCAUC	479	GAUGCCAG	GCCGAAAGGCGAGUCAAGGUCU	AGAAUGCA	1064
4056	GGGAACCU	G	CCAUUGCA	480	UGGCAUUG	GCCGAAAGGCGAGUCAAGGUCU	AGGUUCCC	1065
4061	CUUGCCAG	G	CCAGGAAC	481	GUUCUUGG	GCCGAAAGGCGAGUCAAGGUCU	AGGACAGG	1066
4094	UCCUUCU	G	CUUGAGUU	482	AAUCUAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGAAGGA	1067
4179	GAGGCCCU	G	CCCAUGGA	483	UCAUUGGG	GCCGAAAGGCGAGUCAAGGUCU	AGGGCCUC	1068
4208	CAGUGGAU	G	CCCAAGCC	484	GGCUUGGG	GCCGAAAGGCGAGUCAAGGUCU	AGCCACUG	1069
4351	CUAGUAUC	G	CCCCCAUC	485	AUGGGGGG	GCCGAAAGGCGAGUCAAGGUCU	AGUAUACU	1070
4406	UACAGAGU	G	CUUUUCUG	486	CAGAAAGG	GCCGAAAGGCGAGUCAAGGUCU	ACUUCGUA	1071
492	GGGGCCUU	G	UGCCGUGG	487	CAGCGGCA	GCCGAAAGGCGAGUCAAGGUCU	AAAGCCGC	1072
249	ACCCAGGU	G	UGCCACGG	488	CCGGUCCA	GCCGAAAGGCGAGUCAAGGUCU	ACUUGGGU	1073
387	GCCAGCCU	G	UCCUUCU	489	AGGAAGGA	GCCGAAAGGCGAGUCAAGGUCU	AGGCUAGC	1074
478	UGCGAUUU	G	UGCGAGGC	490	GCCUUGCA	GCCGAAAGGCGAGUCAAGGUCU	AAUUCGCA	1075
559	CCACAGUU	G	UCCACAGG	491	CCCUUGGA	GCCGAAAGGCGAGUCAAGGUCU	AGGGUGGG	1076
678	ACGAUUUU	G	UGGAAGGA	492	UCCUUCUA	GCCGAAAGGCGAGUCAAGGUCU	AAAUUCUU	1077
758	CCACCCCU	G	UUUCUGGA	493	UCCGAGAA	GCCGAAAGGCGAGUCAAGGUCU	AGGGUGGG	1078

Table 59

768	UCUCCGAG	G	UGUAAGGG	494	CCCUUACA	GCCGAAAGGCCGAGUCAAGGUCU	AUCCGGAGA	1079
770	UCCGAUGU	G	UAGAAGCG	495	AGCCCUUA	GCCGAAAGGCCGAGUCAAGGUCU	ACAUAAGA	1080
809	UGAGGAUU	G	UCAGAGCC	496	GGCUUCUG	GCCGAAAGGCCGAGUCAAGGUCU	AUUCUCCA	1081
829	CGCGACGU	G	UCUCUGCC	497	GGCACAGA	GCCGAAAGGCCGAGUCAAGGUCU	AGUGCGCG	1082
833	CACUUGUC	G	UCCCGUG	498	CACCGCGA	GCCGAAAGGCCGAGUCAAGGUCU	AGACAGUG	1083
845	CGUGGGU	G	UGCCGCU	499	AGCGCGCA	GCCGAAAGGCCGAGUCAAGGUCU	AGCCAACG	1084
893	UGAGCAGU	G	UGUCUGCG	500	CGCCAGCA	GCCGAAAGGCCGAGUCAAGGUCU	ACUGUCUA	1085
965	UGGCAUCU	G	UGAGCUGC	501	GCAGUCUA	GCCGAAAGGCCGAGUCAAGGUCU	AGAUGCCA	1086
1058	CGCGACGU	G	UGUGACUG	502	CAGUCACA	GCCGAAAGGCCGAGUCAAGGUCU	AGCUGCGC	1087
1060	CCAGCUGU	G	UGACUGCC	503	GGCAGUCA	GCCGAAAGGCCGAGUCAAGGUCU	ACAGCUGG	1088
1070	GACUGCCU	G	UCCCUACA	504	UGUAGGGA	GCCGAAAGGCCGAGUCAAGGUCU	AGGCAGUC	1089
1166	ACAGCGGU	G	UGAGAAGU	505	ACUUCUCA	GCCGAAAGGCCGAGUCAAGGUCU	ACCGCUGU	1090
1187	CAAGCCCU	G	UGCCCGAG	506	CUCCGCGA	GCCGAAAGGCCGAGUCAAGGUCU	AGGGUCUG	1091
1197	GGCCGAGU	G	UGUAUUG	507	CCAUAGCA	GCCGAAAGGCCGAGUCAAGGUCU	ACUCGGGC	1092
1371	CUCCAAUG	G	UUUGAGAC	508	GUUCAAA	GCCGAAAGGCCGAGUCAAGGUCU	ACUUGAG	1093
1685	GGACGAGU	G	UGUGGGCG	509	CGCCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACUCGUC	1094
1687	ACGAGUGU	G	UGGGCGAG	510	CUCCGCGA	GCCGAAAGGCCGAGUCAAGGUCU	ACAUCUGU	1095
1716	CACGACGU	G	UGCCCGCG	511	CGGGCGCA	GCCGAAAGGCCGAGUCAAGGUCU	AGCUGGUG	1096
1757	CACCCAGU	G	UGUCAUCU	512	AGUUGACA	GCCGAAAGGCCGAGUCAAGGUCU	ACUGGGUG	1097
1759	CCGAGUGU	G	UCAACUGC	513	GCAGUGUA	GCCGAAAGGCCGAGUCAAGGUCU	ACACUGGG	1098
1837	GGGAGAUJ	G	UGAUGCC	514	GGCAUCCA	GCCGAAAGGCCGAGUCAAGGUCU	AUAUCUCC	1099
1853	CAGGCACU	G	UGUGCGU	515	ACGGCAAA	GCCGAAAGGCCGAGUCAAGGUCU	AGUGCCUG	1100
1874	CCCUAGUJ	G	UCAGCCCG	516	GGGGUGUA	GCCGAAAGGCCGAGUCAAGGUCU	ACUCAAGG	1101
1901	AGUGACCU	G	UUUUGGAC	517	GUCCAAA	GCCGAAAGGCCGAGUCAAGGUCU	AGGUCACU	1102
1925	UGACCAUG	G	UGUGGCCU	518	AGGCCACA	GCCGAAAGGCCGAGUCAAGGUCU	ACUGGUGA	1103
1927	ACGAGUGU	G	UGGCCUGU	519	ACAAGCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACAUCAGU	1104
1934	UGUGGCCU	G	UGCCCAUC	520	AGUGGGCA	GCCGAAAGGCCGAGUCAAGGUCU	AGGCCACA	1105
1984	CCAGCGGU	G	UGAAACUC	521	AGGUUCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACCGUCGG	1106
2075	CCACUCCU	G	UGUGGACC	522	GGUCCACA	GCCGAAAGGCCGAGUCAAGGUCU	AGGAGUGG	1107
2077	ACUCCUGU	G	UGGACCGU	523	CAGGUCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACAGGAGU	1108
2410	GGGAGAAU	G	UGAAAUUJ	524	AAUUAUUA	GCCGAAAGGCCGAGUCAAGGUCU	AUUUCUCC	1109
2436	UGCAAAUG	G	UGUAGGGA	525	UCCUCAAA	GCCGAAAGGCCGAGUCAAGGUCU	ACUUUGAU	1110
2503	UGGCGUGU	G	UGGGUCUC	526	GGAGCCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACCAAGCA	1111
2518	CCCCAUJ	G	UCCCGCG	527	GGGGGAGA	GCCGAAAGGCCGAGUCAAGGUCU	AUAUGGGG	1112
2602	UAGACCAU	G	UCCGGGAA	528	UUCCCGGA	GCCGAAAGGCCGAGUCAAGGUCU	AUGGUUJA	1113
2651	GAACUGGU	G	UAUAGAGA	529	UCUGCAUA	GCCGAAAGGCCGAGUCAAGGUCU	ACCAUGUC	1114
2689	UGAGGAUJ	G	UGCGGUCU	530	GAGCGCGA	GCCGAAAGGCCGAGUCAAGGUCU	AUCCUCCA	1115
2749	CCACCAUJ	G	UCAAAUAU	531	AAUUAUGA	GCCGAAAGGCCGAGUCAAGGUCU	AUGGUUGG	1116
2887	AGAGUAUJ	G	UGUGGAGU	532	ACUCCACA	GCCGAAAGGCCGAGUCAAGGUCU	AUACUCUC	1117
2889	AGUAGUAU	G	UGGAGUUA	533	UAAUCUCA	GCCGAAAGGCCGAGUCAAGGUCU	ACAACUCU	1118
2902	GUUAUGGU	G	UGACUGUG	534	CACAGUCA	GCCGAAAGGCCGAGUCAAGGUCU	ACCAUAC	1119
2908	GUUGACUJ	G	UGUGGAGU	535	CUCCCA	GCCGAAAGGCCGAGUCAAGGUCU	AGUCAAC	1120
2910	GUUGACUJ	G	UGGAGUCU	536	AGCUCCCA	GCCGAAAGGCCGAGUCAAGGUCU	ACAGUAC	1121
3025	CCAUUGAU	G	UCUACAUG	537	CAUGUAGA	GCCGAAAGGCCGAGUCAAGGUCU	AUCAUUGG	1122
3047	GUUCAAUJ	G	UGGGUGA	538	UCAUCCA	GCCGAAAGGCCGAGUCAAGGUCU	AUUUGACC	1123
3068	CUUCGAUJ	G	UGCGCAA	539	UUGCGCGA	GCCGAAAGGCCGAGUCAAGGUCU	AUCUAGAG	1124
3093	GAGUUGUJ	G	UCUGAAUJ	540	AAUUCAGA	GCCGAAAGGCCGAGUCAAGGUCU	ACCAACUC	1125

Table 59

3133	AGGCGUUC	G	UGGUCUUC	541	GAUGACCA	GCCGAAAGGCGAGUCAAGGUCU	AAAGCGCU	1126
3269	CUUCUUUC	G	UCCAGACC	542	GGUCUGGA	GCCGAAAGGCGAGUCAAGGUCU	AGAGGAAG	1127
3427	GCUCGAGU	G	UAUUUGAU	543	AUCAAUA	GCCGAAAGGCGAGUCAAGGUCU	AUCGAGAC	1128
3592	CGGAUAU	G	UGAACGAG	544	CUGGUUCA	GCCGAAAGGCGAGUCAAGGUCU	AUAUUCAG	1129
3607	AGCCAGAU	G	UUCCGCC	545	GGCCGGA	GCCGAAAGGCGAGUCAAGGUCU	AUCUGGCU	1130
3939	GUGCGAGU	G	UGAACGAG	546	UUGGUUCA	GCCGAAAGGCGAGUCAAGGUCU	ACUUGCAC	1131
3974	GCCUGUAG	G	UGUCUUC	547	UGAGGACA	GCCGAAAGGCGAGUCAAGGUCU	AUCAGGGC	1132
3976	CCUGAUGU	G	UCCUCAGG	548	CCUGAGGA	GCCGAAAGGCGAGUCAAGGUCU	ACAUUCAG	1133
4072	AGGAACCU	G	UCCUAGG	549	CCUUGAGG	GCCGAAAGGCGAGUCAAGGUCU	AGGUUCU	1134
4162	GAGUCUUC	G	UGGAUUCU	550	AGAAUCCA	GCCGAAAGGCGAGUCAAGGUCU	AAAGACUC	1135
4300	AAAGCGAGU	G	UCUAGAA	551	UUUUUAGA	GCCGAAAGGCGAGUCAAGGUCU	ACUCCUUC	1136
4332	CAGAGACU	G	UCCUCGAA	552	UUUCAGGA	GCCGAAAGGCGAGUCAAGGUCU	AGUCUCUG	1137
4380	GCAUUGGU	G	UCAGUAUC	553	GAUACUGA	GCCGAAAGGCGAGUCAAGGUCU	ACCAUUCG	1138
4397	CAGGCUUC	G	UACAGAGU	554	ACUCUGUA	GCCGAAAGGCGAGUCAAGGUCU	AAAGCCUG	1139
4414	GUUUUUUC	G	UUUAGUUU	555	AAACUAAA	GCCGAAAGGCGAGUCAAGGUCU	AGAAAAGC	1140
4434	UUUUUUUC	G	UUUUUUUU	556	AAACAAAA	GCCGAAAGGCGAGUCAAGGUCU	AAAAAAGC	1141
4439	UUUUUUUC	G	UUUUUUUA	557	UAAAAAAA	GCCGAAAGGCGAGUCAAGGUCU	AAAAAAGC	1142
9	AAAGGAGG	G	UAAACCCG	558	CAGGDUUA	GCCGAAAGGCGAGUCAAGGUCU	UUUUUUUC	1143
18	UAACCCUG	G	CCUUUUG	559	CAAAAGGG	GCCGAAAGGCGAGUCAAGGUCU	CAGGDUUA	1144
27	CCCUUUGG	G	UCGGGGCC	560	GGCCCCGA	GCCGAAAGGCGAGUCAAGGUCU	CAAAAGGG	1145
33	UGGUGGGG	G	CCCCGGCC	561	GGCCCCGG	GCCGAAAGGCGAGUCAAGGUCU	CCCCGCA	1146
40	GGCCCCGG	G	CAGCGCGG	562	CGCGUUG	GCCGAAAGGCGAGUCAAGGUCU	CCGGGGCC	1147
43	CCCGGGCA	G	CCGGCGCG	563	CGCGCGG	GCCGAAAGGCGAGUCAAGGUCU	CCCGGGG	1148
65	CCACGCGG	G	CCUUUAC	564	GUAAAGGG	GCCGAAAGGCGAGUCAAGGUCU	CCCUUGGG	1149
89	CGCGCCCG	G	CCCCCACC	565	GGUUGGGG	GCCGAAAGGCGAGUCAAGGUCU	CGCGCGG	1150
105	CCCUCCGA	G	CACCCCGC	566	GGCGGUGG	GCCGAAAGGCGAGUCAAGGUCU	UGCGAGGG	1151
130	CCCUCCGA	G	CGGGUCC	567	GGACCCGG	GCCGAAAGGCGAGUCAAGGUCU	UGGGAGGG	1152
135	CCAGCCGG	G	UCCAGCCG	568	CGGUCUGA	GCCGAAAGGCGAGUCAAGGUCU	CCGGUUGG	1153
140	CGGGUCCA	G	CCGAGGCC	569	GGUCUCCG	GCCGAAAGGCGAGUCAAGGUCU	UGGACCCG	1154
146	CAGCGCGA	G	CCAUUGGG	570	CCCAUUGG	GCCGAAAGGCGAGUCAAGGUCU	UCCGGCUG	1155
154	CCCAUUGG	G	CCGAGGCC	571	GGUCUCCG	GCCGAAAGGCGAGUCAAGGUCU	CCCAUUGG	1156
160	GGGCGCGA	G	CCGAGGUC	572	CACUUGCG	GCCGAAAGGCGAGUCAAGGUCU	UCCGGGCC	1157
166	GAGCGCGA	G	UGAGCACC	573	GGUCUCUA	GCCGAAAGGCGAGUCAAGGUCU	UGCGGCU	1158
170	CGCAGUGA	G	CACCAUUG	574	CCAUUGUG	GCCGAAAGGCGAGUCAAGGUCU	UCCAUUGG	1159
180	ACCAUGGA	G	UUGGCGGC	575	GGCGCCAG	GCCGAAAGGCGAGUCAAGGUCU	UCCAUUGG	1160
184	UGGAGUUG	G	CGGCUUUG	576	CAAGGCCG	GCCGAAAGGCGAGUCAAGGUCU	CAGCUCCA	1161
187	AGUCGGCG	G	CCUUGUUC	577	GCACAAAG	GCCGAAAGGCGAGUCAAGGUCU	CCCCAGCU	1162
204	CGUCGGGG	G	UUUUUUUC	578	AGGAGGAG	GCCGAAAGGCGAGUCAAGGUCU	CCCCAGCG	1163
232	CCCCCGGA	G	CCGCGAGC	579	GUUCGGCG	GCCGAAAGGCGAGUCAAGGUCU	UCCGGGGG	1164
239	AGCCCGGA	G	CACCCAGC	580	UUUUGGUG	GCCGAAAGGCGAGUCAAGGUCU	UCCGGCGU	1165
247	GCACCCAA	G	UGUGCACC	581	GGUGCACA	GCCGAAAGGCGAGUCAAGGUCU	UUUGGUGC	1166
257	GUGCAGCG	G	CACAGACA	582	UGUCUGUG	GCCGAAAGGCGAGUCAAGGUCU	CGGUGCAC	1167
270	GACAUAGA	G	CUCCGCGU	583	AGCCGCGAG	GCCGAAAGGCGAGUCAAGGUCU	UUCAUUGC	1168
276	AAUGUGCG	G	CUCCUUGC	584	GCAGCGAG	GCCGAAAGGCGAGUCAAGGUCU	CGCAGUUC	1169
287	CCUCCGCA	G	UCCCGAGA	585	UUUCGCGA	GCCGAAAGGCGAGUCAAGGUCU	UGGCAAGG	1170
329	CUACCCAG	G	CUUGCCAG	586	CUUGCGAG	GCCGAAAGGCGAGUCAAGGUCU	CCUGGUGG	1171
337	GUUGCCAG	G	UGGUGCAG	587	CUGCACCA	GCCGAAAGGCGAGUCAAGGUCU	CUUGCGAG	1172

Table 59

340	GCCAGGUG G UGCAGGGA	588	UCCUGCA GCCGAAAGGCCGAGUCAAGGUCU	CACCUIGGC	1173
383	CUUUGCCA G CCUCUGCU	589	AGGACAGG GCCGAAAGGCCGAGUCAAGGUCU	UGGCUUUG	1174
412	UCCAGGAG G UGCAGGGC	590	GCCUGCA GCCGAAAGGCCGAGUCAAGGUCU	CCUCUGGA	1175
419	GGUGCAG G CUACGUGC	591	GCAUGAG GCCGAAAGGCCGAGUCAAGGUCU	CUGCACC	1176
424	AGGGCUAC G UGCUCUAC	592	GAUGAGCA GCCGAAAGGCCGAGUCAAGGUCU	GUAGCCCU	1177
445	ACUACCAA G UGAGGCGAG	593	CUGCCUCA GCCGAAAGGCCGAGUCAAGGUCU	UUGGUTUG	1178
450	CAGUGAG G CAGUCCCC	594	GGGACUUG GCCGAAAGGCCGAGUCAAGGUCU	CUACUUG	1179
454	UGAGGCGAG G UCCACUUG	595	CAGUGGGA GCCGAAAGGCCGAGUCAAGGUCU	CUGCCUCA	1180
468	CUGCAGAG G CUGCGGAU	596	AUCCGAG GCCGAAAGGCCGAGUCAAGGUCU	CUCUGCAG	1181
485	UGUGCAG G CACCCAGC	597	GCUGGGUG GCCGAAAGGCCGAGUCAAGGUCU	CUCCGACA	1182
492	GGCACCCA G CUUUUGA	598	UCAAAGAG GCCGAAAGGCCGAGUCAAGGUCU	UGGUGGCC	1183
517	AUGCCCUU G CCGUGCUA	599	UAGCACGG GCCGAAAGGCCGAGUCAAGGUCU	CAGGCGAU	1184
520	CCCUUGCC G UGCUAGAC	600	GUUUGCA GCCGAAAGGCCGAGUCAAGGUCU	GGCAGGG	1185
568	UCACAGGG G CCUCCCCA	601	UGGGAGGG GCCGAAAGGCCGAGUCAAGGUCU	CCCUUGGA	1186
581	CCACAGAG G CCUCGGGG	602	CCCGCAGG GCCGAAAGGCCGAGUCAAGGUCU	CUCCUGGG	1187
591	CUGCGGA G CUGCAGCU	603	AGCUUCAG GCCGAAAGGCCGAGUCAAGGUCU	UCCCGCAG	1188
597	GAGUCUGA G UUCGGAAG	604	CUUUGAAG GCCGAAAGGCCGAGUCAAGGUCU	UGCAGCUC	1189
605	AGUGCGAA G CCUCACAG	605	CUGUGAGG GCCGAAAGGCCGAGUCAAGGUCU	CUCCAGAC	1190
631	GAUGAGGG G UCUUGAUC	606	GAUCAA GA GCCGAAAGGCCGAGUCAAGGUCU	UUUCUUIU	1191
642	UUGAUCCA G CGGAACCC	607	GGGUUCCG GCCGAAAGGCCGAGUCAAGGUCU	UGGAUCAA	1192
654	AACCCCCA G CUGUGUA	608	UAGCAGAG GCCGAAAGGCCGAGUCAAGGUCU	UGGGGUGU	1193
708	AACAACCA G CUCUCUCU	609	AGAGCCAG GCCGAAAGGCCGAGUCAAGGUCU	UUGUUGU	1194
712	ACCAGCUG G CUUCACA	610	UGUUGAGG GCCGAAAGGCCGAGUCAAGGUCU	CAGCUGGU	1195
745	GCTUCUGG G CCUCGAC	611	UGGCGAG GCCGAAAGGCCGAGUCAAGGUCU	CCGAGAGC	1196
776	GUGUAAGG G CUUCGCU	612	AGCGGGAG GCCGAAAGGCCGAGUCAAGGUCU	CUUACAC	1197
797	GGGAGAGA G UUCUGAGG	613	CCUCAAGA GCCGAAAGGCCGAGUCAAGGUCU	UUCUCUCC	1198
815	UUCUCAGA G CCUGACGC	614	GCUCUAGG GCCGAAAGGCCGAGUCAAGGUCU	UUCGACAA	1199
839	CUUGCCGG G UGGCUGUG	615	CACAGCCA GCCGAAAGGCCGAGUCAAGGUCU	CGGACAG	1200
842	UCCCGGUG G CUGUGCCC	616	GGGACAG GCCGAAAGGCCGAGUCAAGGUCU	CACCGCA	1201
861	UGCAAGGG G CCACUGCC	617	GGCAGUGG GCCGAAAGGCCGAGUCAAGGUCU	CCCUUGCA	1202
888	UGCAUGA G CAGUGUGC	618	GCAACUUG GCCGAAAGGCCGAGUCAAGGUCU	UCAUGCA	1203
891	CAUGAGCA G UGUGUGGC	619	GCAGACA GCCGAAAGGCCGAGUCAAGGUCU	CAUCUUG	1204
902	UGUCGCC G CUGCACCG	620	CCGUGCAG GCCGAAAGGCCGAGUCAAGGUCU	CGGACGA	1205
911	CGCACGG G CCCCAGC	621	GCUGGGGG GCCGAAAGGCCGAGUCAAGGUCU	CCGUGCAG	1206
918	GUCGCCAA G CACUCUGA	622	UCAGAGUG GCCGAAAGGCCGAGUCAAGGUCU	UUGGGGCC	1207
934	ACUGCCUG G CCUGCUC	623	GAGGCGAG GCCGAAAGGCCGAGUCAAGGUCU	CAGGCGU	1208
956	CAACCA G UGGGCUU	624	AGAUGCCA GCCGAAAGGCCGAGUCAAGGUCU	UGUGGUG	1209
959	CCACAGUG G CAUCUGUG	625	CACGAGUG GCCGAAAGGCCGAGUCAAGGUCU	CACUUGG	1210
969	AUCUGGA G CUGCAGUG	626	CAGUGCAG GCCGAAAGGCCGAGUCAAGGUCU	UACAGAU	1211
982	AUGGCCCA G CCUGGUC	627	GAACAGGG GCCGAAAGGCCGAGUCAAGGUCU	UGGGCAGU	1212
988	CAGCCUUG G UCACTUAC	628	GUAGGUGA GCCGAAAGGCCGAGUCAAGGUCU	CAGGCGU	1213
1008	ACAGACAC G UUUUGAUG	629	GAUCUAAA GCCGAAAGGCCGAGUCAAGGUCU	GUUGUCU	1214
1014	ACGUGUGA G UCAUGGCC	630	GGCAUGGA GCCGAAAGGCCGAGUCAAGGUCU	UCAAACGU	1215
1034	UCCGAGGG G CCGGUAUA	631	UAUACCGG GCCGAAAGGCCGAGUCAAGGUCU	CCUCGGA	1216
1038	GAGGGCG G UAUAUUA	632	UAUGUAUA GCCGAAAGGCCGAGUCAAGGUCU	CGGCCUC	1217
1049	UAUAUUG G CGCCAGC	633	AGCUGGCG GCCGAAAGGCCGAGUCAAGGUCU	CGAAUGUA	1218
1055	CGCGCCA G CUGUGUGA	634	UCACAGAG GCCGAAAGGCCGAGUCAAGGUCU	UGGCGCG	1219

Table 59

1096	CUACGGAG	G	UGGGAUCC	635	GGAUCCCA	GCCGAAAGGCGAGUCAAGGUCU	GUCCGUAG	1220
1114	GCACCCUC	G	UCUGCCCC	636	GGGGCAGA	GCCGAAAGGCGAGUCAAGGUCU	GAAGGUGC	1221
1138	ACCAAGAG	G	UGACAGCA	637	UGCUUGCA	GCCGAAAGGCGAGUCAAGGUCU	CUUCUGGU	1222
1144	AGGUGACA	G	CAGAGGAU	638	AUCCUCUG	GCCGAAAGGCGAGUCAAGGUCU	UGUCAACU	1223
1161	GGACACA	G	CGUGUGA	639	UCACACCG	GCCGAAAGGCGAGUCAAGGUCU	UGUGUCC	1224
1164	ACACAGCG	G	UGUGAGAA	640	UUCUCA	GCCGAAAGGCGAGUCAAGGUCU	CGCUUGU	1225
1173	UGUGAGAA	G	USCAGCA	641	UGUCUGCA	GCCGAAAGGCGAGUCAAGGUCU	UUCUCA	1226
1178	GAUGUGCA	G	CAAGCCCU	642	AGGGCUCU	GCCGAAAGGCGAGUCAAGGUCU	UGCAUCUC	1227
1182	UGCAGACA	G	CCUGUGC	643	GCACAGGG	GCCGAAAGGCGAGUCAAGGUCU	UUGCAACU	1228
1195	GUGGCCGA	G	UGUGCUAU	644	AUACACA	GCCGAAAGGCGAGUCAAGGUCU	UGGGGCAC	1229
1205	GUUCUAUG	G	UCUGGCA	645	UGCCCGA	GCCGAAAGGCGAGUCAAGGUCU	CAUAGCAC	1230
1211	UGUCUGG	G	CAUGAGC	646	GUCCUAUG	GCCGAAAGGCGAGUCAAGGUCU	CCAGACCA	1231
1218	GCUAUGGA	G	CACUUGCG	647	CGCAAGUG	GCCGAAAGGCGAGUCAAGGUCU	UCCAUCC	1232
1231	UGCGAGAG	G	UGAGGGCA	648	UGCCUCUA	GCCGAAAGGCGAGUCAAGGUCU	CUUCGCA	1233
1237	AGGUGAGG	G	CAGUUAAC	649	GGUAACUG	GCCGAAAGGCGAGUCAAGGUCU	CCUACAACU	1234
1240	UGAGGGCA	G	UUAACAGU	650	ACUGUAUA	GCCGAAAGGCGAGUCAAGGUCU	UGCCCUCA	1235
1247	AUTUAACA	G	UGCCAAUA	651	UAUUGGCA	GCCGAAAGGCGAGUCAAGGUCU	UGGUAACU	1236
1263	AUACAGGA	G	UUUGCUUG	652	CCAGCAAA	GCCGAAAGGCGAGUCAAGGUCU	UCUGGAU	1237
1271	GUTUUCUG	G	CUUCABGA	653	UCUUGCAG	GCCGAAAGGCGAGUCAAGGUCU	CACCAAAC	1238
1292	CUUUGGGA	G	CCUGGCAU	654	AUGCCAGG	GCCGAAAGGCGAGUCAAGGUCU	UCCCAAG	1239
1297	GGAGCCUG	G	CAUUDUCG	655	CAGAAUUG	GCCGAAAGGCGAGUCAAGGUCU	CAGGCUCC	1240
1313	GCCGGAGA	G	CUUUGAUG	656	CAUCAAGG	GCCGAAAGGCGAGUCAAGGUCU	UCUCCGAC	1241
1330	GGGACCCA	G	CCUCCAAC	657	GUUGGAUG	GCCGAAAGGCGAGUCAAGGUCU	UGGUGUCC	1242
1353	CCGCUUCA	G	CCAGAGCA	658	UGUCUUGG	GCCGAAAGGCGAGUCAAGGUCU	UGAGCCGC	1243
1359	CAGCCAGA	G	CAGCUCCA	659	UGGAGCTUG	GCCGAAAGGCGAGUCAAGGUCU	UCTGGCTG	1244
1362	CCAGAGCA	G	CUCCAAUG	660	ACUUGGAG	GCCGAAAGGCGAGUCAAGGUCU	UGUCUCGG	1245
1369	AGCUCCAA	G	UGUUDGAG	661	CUCAAAAC	GCCGAAAGGCGAGUCAAGGUCU	UUAGAGCU	1246
1397	GAUCACAG	G	UUAUCCAU	662	AUAGGUUA	GCCGAAAGGCGAGUCAAGGUCU	CUUGUAUC	1247
1414	ACAUUCUA	G	CCUGGCGG	663	CGGCCAUG	GCCGAAAGGCGAGUCAAGGUCU	UGAGAUGU	1248
1419	UCAGCAUG	G	CGGAGACG	664	CUUUCUGG	GCCGAAAGGCGAGUCAAGGUCU	CAUUGUGA	1249
1427	GCCGGAGA	G	CGUGCCUG	665	CAGGCAGG	GCCGAAAGGCGAGUCAAGGUCU	UGUCCGAC	1250
1442	UGACUCA	G	CCUUCUCC	666	GGAGAGCG	GCCGAAAGGCGAGUCAAGGUCU	UGAGGUCA	1251
1444	ACUUCAGC	G	UCUUCGAG	667	CUUGAAGA	GCCGAAAGGCGAGUCAAGGUCU	GCUGAGGU	1252
1462	ACUUCGAA	G	UAUUCGCG	668	CCGGAUUA	GCCGAAAGGCGAGUCAAGGUCU	UUGCAGGU	1253
1490	GCACAAUG	G	CGCCUACU	669	AGUAGGCG	GCCGAAAGGCGAGUCAAGGUCU	CAUUGGUC	1254
1515	CUGCAAGG	G	CUUGGCAU	670	AUGCCGAG	GCCGAAAGGCGAGUCAAGGUCU	CCUUGCAG	1255
1520	AGGCGUGG	G	CAUUCAGU	671	AGCUAUG	GCCGAAAGGCGAGUCAAGGUCU	CCAGCCCU	1256
1526	GGCAUCA	G	CUUGUGUG	672	CCAGCCAG	GCCGAAAGGCGAGUCAAGGUCU	UGAUGCCC	1257
1530	AUACUGUG	G	CUUGGUGU	673	AGCCCCAG	GCCGAAAGGCGAGUCAAGGUCU	CCAGUGAU	1258
1536	UGUCUGGG	G	CUUGGUCU	674	GAGCGCAG	GCCGAAAGGCGAGUCAAGGUCU	CCAGCCCA	1259
1559	GGAAUCUG	G	CAGUGGAC	675	GUCCACTUG	GCCGAAAGGCGAGUCAAGGUCU	CCAGUUCU	1260
1562	ACUGGGCA	G	UGGACUGU	676	CCAGUCCA	GCCGAAAGGCGAGUCAAGGUCU	UGCCCAUG	1261
1570	GGCAUCUG	G	CGCCUACU	677	GAUGAGGG	GCCGAAAGGCGAGUCAAGGUCU	CAGUCAC	1262
1603	UCUGCUUC	G	UGACACCG	678	CGUGUGCA	GCCGAAAGGCGAGUCAAGGUCU	GAAGCAGA	1263
1612	UGCAACCG	G	UGCCUUGG	679	CCAGGGCA	GCCGAAAGGCGAGUCAAGGUCU	CGUGUGCA	1264
1626	UGGAGCCA	G	CUUUCUUG	680	CGAAAGAG	GCCGAAAGGCGAGUCAAGGUCU	UGUUCCCA	1265
1648	CGCACCAA	G	CUUCUGUC	681	GAGCAGAG	GCCGAAAGGCGAGUCAAGGUCU	UUGUGGCG	1266

Table 59

1671	GCCAACCG	G	CCAGAGGA	682	UCCUCUGG	GCCGAAAAGGCGAGUCAAGGUCU	CGGUU/GGC	1267
1683	GAGGACGA	G	UGUGUGGG	683	CCACACAC	GCCGAAAAGGCGAGUCAAGGUCU	UCGUU/CUC	1268
1691	GUGUGUGG	G	CGAGGGCC	684	GGCCUCUG	GCCGAAAAGGCGAGUCAAGGUCU	CCACACAC	1269
1697	GGGCGAGG	G	CCUGGCCU	685	AGGCCAGG	GCCGAAAAGGCGAGUCAAGGUCU	CCUGGCCU	1270
1702	AGGCCGUG	G	CCUGCCAC	686	GUGGCGAG	GCCGAAAAGGCGAGUCAAGGUCU	CAGGCCUC	1271
1713	UGCCACGA	G	CUUGUGCG	687	GCACACAG	GCCGAAAAGGCGAGUCAAGGUCU	UGGUGGCA	1272
1728	GCCCGAGG	G	CACUGCUG	688	CAGCAGUG	GCCGAAAAGGCGAGUCAAGGUCU	CCUCG/GGC	1273
1739	CUGCUGGG	G	UCCAGGGC	689	GCCUCUGA	GCCGAAAAGGCGAGUCAAGGUCU	CCCGCAG	1274
1746	GGUCCAGG	G	CCACCCCA	690	UGGUGUGG	GCCGAAAAGGCGAGUCAAGGUCU	CCUGGCCU	1275
1755	CCACCCCA	G	UGUGUCA	691	UGACACAC	GCCGAAAAGGCGAGUCAAGGUCU	UGGUGGCG	1276
1769	CAACUGCA	G	CCAGUUCU	692	GGAAUCUG	GCCGAAAAGGCGAGUCAAGGUCU	UGCAGUUG	1277
1773	UGCAGCCA	G	UUCUUGCG	693	CGAAGGAA	GCCGAAAAGGCGAGUCAAGGUCU	UGGUCUGCA	1278
1784	CCUUCGGG	G	CCAGGAGU	694	ACUCUCUG	GCCGAAAAGGCGAGUCAAGGUCU	CCCGAAGG	1279
1791	GGCCAGGA	G	UGCGUGGA	695	UCCACGCA	GCCGAAAAGGCGAGUCAAGGUCU	UCCUGGCC	1280
1795	AGGAGUGC	G	UGAGGGAA	696	UUCUCCCA	GCCGAAAAGGCGAGUCAAGGUCU	GCACUCCU	1281
1810	AAUGCCGA	G	UACUUCAG	697	CUGCAGUA	GCCGAAAAGGCGAGUCAAGGUCU	UCGGCAU	1282
1821	CUGCAGGG	G	CUCCCGAC	698	CUGGGGAG	GCCGAAAAGGCGAGUCAAGGUCU	CCCGCAG	1283
1833	CCACGGGA	G	UAGUGAAA	699	UUCACAU	GCCGAAAAGGCGAGUCAAGGUCU	UCCUCGGG	1284
1848	AAUGCCAG	G	CACUUGUU	700	AAACACUG	GCCGAAAAGGCGAGUCAAGGUCU	CUGGCAU	1285
1860	UGUUGGCC	G	UGCCACCC	701	GGGUGGCA	GCCGAAAAGGCGAGUCAAGGUCU	GGCAUACA	1286
1872	CACCCUGA	G	UGUCAGCG	702	GGCUGACA	GCCGAAAAGGCGAGUCAAGGUCU	UCAGGUGU	1287
1878	GAUGGUGA	G	CCCGACAA	703	UUCUGGGG	GCCGAAAAGGCGAGUCAAGGUCU	UGACACUC	1288
1889	CCAGAAUG	G	CUACUGUA	704	UCACUGAG	GCCGAAAAGGCGAGUCAAGGUCU	CAUUCUGG	1289
1894	AUGGCUCA	G	UGACCCUG	705	ACAGGUGA	GCCGAAAAGGCGAGUCAAGGUCU	UGAGCCAU	1290
1915	CACCGGAG	G	CUGACAG	706	CUGGUCAG	GCCGAAAAGGCGAGUCAAGGUCU	CUCCGGUC	1291
1923	CGUACCCA	G	UGUGUGGC	707	GCCACACA	GCCGAAAAGGCGAGUCAAGGUCU	UGGUCAGC	1292
1930	AGUGUGUG	G	CCUGUGCC	708	GGCACAGG	GCCGAAAAGGCGAGUCAAGGUCU	CACACACU	1293
1963	CCUUCUGC	G	UGGCCCGC	709	GCGGGCCA	GCCGAAAAGGCGAGUCAAGGUCU	GCAAGAGG	1294
1966	UGUGCGUG	G	CCCGCUGC	710	GCAGCGGG	GCCGAAAAGGCGAGUCAAGGUCU	CACGCGAG	1295
1979	CUGGCCCA	G	CGUGUGUA	711	UCACACCG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGG/CAG	1296
1982	CCCCAGCG	G	UGUGAAAC	712	GUUUCACA	GCCGAAAAGGCGAGUCAAGGUCU	CGCUGGGG	1297
2019	AUCUGGAA	G	UUCACAGA	713	UCUGGAAA	GCCGAAAAGGCGAGUCAAGGUCU	UUCACAGU	1298
2036	UGAGGAGG	G	CGCAUGCC	714	GGCAUGCG	GCCGAAAAGGCGAGUCAAGGUCU	CCUCCUCA	1299
2046	GCAUGCCA	G	CCUUGGCC	715	GGCCAAAG	GCCGAAAAGGCGAGUCAAGGUCU	UGGCAUGC	1300
2096	UGACAAAG	G	CGUGCCCG	716	CGGGG/CAG	GCCGAAAAGGCGAGUCAAGGUCU	CCUUGGUA	1301
2109	CCCGCCGA	G	CGAGAGGC	717	GCUCUCUG	GCCGAAAAGGCGAGUCAAGGUCU	UCGGG/CGG	1302
2116	AGCAGAGA	G	CCAGCCCU	718	AGGGCUGG	GCCGAAAAGGCGAGUCAAGGUCU	UUCUUGCU	1303
2120	GAGAGCCA	G	CCUUCUGA	719	UCAGAGGG	GCCGAAAAGGCGAGUCAAGGUCU	UGGUCUUC	1304
2130	CCUUGCAG	G	UCCAUCAU	720	AUGAUGGA	GCCGAAAAGGCGAGUCAAGGUCU	GUCAGAGG	1305
2146	UUCUUGCG	G	UGGUUGCG	721	GCCAACCA	GCCGAAAAGGCGAGUCAAGGUCU	CGCAGAGA	1306
2149	CUGCGGUG	G	UUGGCAU	722	AAUGCCAA	GCCGAAAAGGCGAGUCAAGGUCU	CACCGCAG	1307
2153	GGUGGUGG	G	CAUUCUGC	723	CGAGAAUG	GCCGAAAAGGCGAGUCAAGGUCU	CAACCAAC	1308
2164	UUCUGCUG	G	CGUGUGUC	724	GACCA/GA	GCCGAAAAGGCGAGUCAAGGUCU	CAGCAGAA	1309
2167	UGCUGGUC	G	UGGUUUGG	725	CAAGACCA	GCCGAAAAGGCGAGUCAAGGUCU	GACCA/GA	1310
2170	UGUGCGUG	G	UUCUGGGG	726	CCCCAAGA	GCCGAAAAGGCGAGUCAAGGUCU	CACACCA	1311
2179	UUCUGGGG	G	UGGUUUGG	727	AAAGACCA	GCCGAAAAGGCGAGUCAAGGUCU	CCGCAAGA	1312
2182	UGGGGUGG	G	UUCUUGGG	728	CCCAAGA	GCCGAAAAGGCGAGUCAAGGUCU	CACCCCA	1313

Table 59

2202	CUCAUCA	G	CGACGGCA	729	UGCCGUCG	GCCGAAAAGGCGAGUCAAGGUCU	UGUAUGAG	1314
2208	AGCGAGCG	G	CAGACAAA	730	UUCUGUCG	GCCGAAAAGGCGAGUCAAGGUCU	CGGCGCUU	1315
2211	CGACGGCA	G	CAGAAAGU	731	AUUCUUCG	GCCGAAAAGGCGAGUCAAGGUCU	UGCCGUCG	1316
2226	AUCCGGAA	G	UACACGAU	732	AUCGUGUA	GCCGAAAAGGCGAGUCAAGGUCU	UUCGCGAU	1317
2259	GAACCGAA	G	UGUGUGGA	733	UCCACGAG	GCCGAAAAGGCGAGUCAAGGUCU	UCCGUGUC	1318
2263	CGAGCGUG	G	UGGAGCCG	734	CGCGUCCA	GCCGAAAAGGCGAGUCAAGGUCU	CAGCUCUG	1319
2268	UGGUGGGA	G	CCGCGGAC	735	GUACGCGG	GCCGAAAAGGCGAGUCAAGGUCU	UCCACCGG	1320
2282	GACACCUA	G	CGGAGCGA	736	UCCGUCUG	GCCGAAAAGGCGAGUCAAGGUCU	UAGGUGUC	1321
2287	CUAGCGGA	G	CGAUGGCC	737	GGGCAUCG	GCCGAAAAGGCGAGUCAAGGUCU	UCCGCUAG	1322
2302	CCACCGAG	G	CGCAGAUU	738	CAUCUGCG	GCCGAAAAGGCGAGUCAAGGUCU	CUUGUUGG	1323
2331	GAGACCGA	G	CUAGGAAA	739	UUCUCUAG	GCCGAAAAGGCGAGUCAAGGUCU	UCCGUCUC	1324
2341	UGAGGAGG	G	UGAAGGUG	740	CACCUCCA	GCCGAAAAGGCGAGUCAAGGUCU	CUUCCUCA	1325
2347	AGGUGAAG	G	UGCUUGGA	741	UCCAGCCA	GCCGAAAAGGCGAGUCAAGGUCU	CUUCCACU	1326
2360	UGGAGUCG	G	CGCUUUUG	742	CRAAAGCG	GCCGAAAAGGCGAGUCAAGGUCU	CAGAUCCA	1327
2369	CGCUUUUG	G	CACAGUCU	743	AGACUGUG	GCCGAAAAGGCGAGUCAAGGUCU	CJAAAGCG	1328
2374	UUGGCACA	G	UCUACAGG	744	CUUUGAGA	GCCGAAAAGGCGAGUCAAGGUCU	UGUGCCAA	1329
2384	CUACRAGG	G	CAUCUGGA	745	UCCAGAUU	GCCGAAAAGGCGAGUCAAGGUCU	CCUUGUAG	1330
2422	AAAUUCCA	G	UGGCACUC	746	GAUGGCCA	GCCGAAAAGGCGAGUCAAGGUCU	UGGAUUUU	1331
2425	UUCGAGUG	G	CAUCRANA	747	UUGAUUGG	GCCGAAAAGGCGAGUCAAGGUCU	CACUGGAA	1332
2434	CCAUCAAA	G	UGUUGAGG	748	CCUCAACA	GCCGAAAAGGCGAGUCAAGGUCU	UUUGAUGG	1333
2461	CCCCCAAA	G	CCAACAAA	749	UULUGUUG	GCCGAAAAGGCGAGUCAAGGUCU	UUUGGGGG	1334
2485	UAGACGAA	G	CAUACGUG	750	CACGUAUG	GCCGAAAAGGCGAGUCAAGGUCU	UUCGUCUA	1335
2491	AGCAUACG	G	UGAUGGCU	751	AGCCAUCA	GCCGAAAAGGCGAGUCAAGGUCU	GUAGUCU	1336
2497	ACUGAUGG	G	CUUGGUGG	752	CACACCGG	GCCGAAAAGGCGAGUCAAGGUCU	CAUACCGU	1337
2501	GAUGGCGU	G	CUUGGGCU	753	AGCCCAUA	GCCGAAAAGGCGAGUCAAGGUCU	CAGCCAUU	1338
2507	UGGUGGUG	G	CUUCCCAU	754	AUGGGGAG	GCCGAAAAGGCGAGUCAAGGUCU	CCACACCA	1339
2534	CCUUCUGG	G	CAUCUGCC	755	GGCAGAUU	GCCGAAAAGGCGAGUCAAGGUCU	CCAGAAGG	1340
2554	CAUCCACG	G	UGCAGCUG	756	CAGCUGCA	GCCGAAAAGGCGAGUCAAGGUCU	CGUGGAUG	1341
2559	ACGGUGCA	G	CUUGGUGG	757	GUCCACAG	GCCGAAAAGGCGAGUCAAGGUCU	UGCACCGU	1342
2563	UGCAGCUG	G	UGACAACG	758	CUUGUCCA	GCCGAAAAGGCGAGUCAAGGUCU	CAGCUGCA	1343
2571	GUACAGCA	G	CUUAUGCC	759	GGCAUJAG	GCCGAAAAGGCGAGUCAAGGUCU	UGUGUAC	1344
2585	GGCCUJAG	G	UGCCUUCU	760	AGAGCCAG	GCCGAAAAGGCGAGUCAAGGUCU	CAUAGGCG	1345
2627	AGCCGUGG	G	CUUCCAGG	761	CCUGGGAG	GCCGAAAAGGCGAGUCAAGGUCU	CCAGGCGU	1346
2649	CGGAACUG	G	UGUAUGCA	762	UGCAUACA	GCCGAAAAGGCGAGUCAAGGUCU	CAGUUCAG	1347
2675	GGGGAUGA	G	CUACUUGG	763	CCAGUJAG	GCCGAAAAGGCGAGUCAAGGUCU	UCAUCCCC	1348
2694	GAUGUGCG	G	CUUGUACA	764	UGUACGAG	GCCGAAAAGGCGAGUCAAGGUCU	CGCACAUU	1349
2698	UGGCGCUC	G	UACACAGG	765	CCUGUGUA	GCCGAAAAGGCGAGUCAAGGUCU	GAGCCCGA	1350
2713	GGGAUUGG	G	CGGCUCCG	766	CCGAGCGG	GCCGAAAAGGCGAGUCAAGGUCU	CAGUCCCC	1351
2725	CGCGGAAC	G	UCUGUGUC	767	GACCAACA	GCCGAAAAGGCGAGUCAAGGUCU	GUUCCGAG	1352
2731	ACUGGUCG	G	UGCAAGAU	768	ACUUCUGA	GCCGAAAAGGCGAGUCAAGGUCU	CAGCACGU	1353
2738	GGUCAAGA	G	UCCCAACC	769	GGUUGGGA	GCCGAAAAGGCGAGUCAAGGUCU	UCUUGACC	1354
2769	GACUUCGG	G	CUUGGUCG	770	CGAGCCAG	GCCGAAAAGGCGAGUCAAGGUCU	CCGAAUUC	1355
2773	UUGGGGUG	G	CUUGGUCG	771	CAGCCGAG	GCCGAAAAGGCGAGUCAAGGUCU	CAGCCCGA	1356
2778	CUUGGUCG	G	CUUGGUGA	772	UCCAGCAG	GCCGAAAAGGCGAGUCAAGGUCU	CGAGCCAG	1357
2802	GAGACAGA	G	UACCAUUC	773	GCAUGGUA	GCCGAAAAGGCGAGUCAAGGUCU	UCUUGUCU	1358
2819	AGAUUGGG	G	CGAGGUGC	774	GACCCUUG	GCCGAAAAGGCGAGUCAAGGUCU	CCCAUUCU	1359
2824	GGGCGAAG	G	UGCCGAGC	775	GAUGGCGA	GCCGAAAAGGCGAGUCAAGGUCU	CUUGCCCC	1360

Table 59

2835	CCCAUCAA	G	UGGAUGGC	776	GCACUCCA	GCCGAAAAGGCGAGUCAAGGUCU	UUGAUUGG	1361
2842	AGUGAUG	G	CGCUGGAG	777	CUCCAGCG	GCCGAAAAGGCGAGUCAAGGUCU	CAUCCACU	1362
2850	GCUCUGGA	G	UCCAUCUC	778	AGAAUGGA	GCCGAAAAGGCGAGUCAAGGUCU	UCCAGCGC	1363
2865	CGCCGCG	G	CGGUUAC	779	GUACAACG	GCCGAAAAGGCGAGUCAAGGUCU	CGCGGGAG	1364
2868	CGCCGGCG	G	UUCACCCA	780	UGGUGAUA	GCCGAAAAGGCGAGUCAAGGUCU	CGCGGGCG	1365
2882	CCACACAG	G	UUGUGUUG	781	ACACAUCA	GCCGAAAAGGCGAGUCAAGGUCU	UCUGGUGG	1366
2894	UGUGUGGA	G	UUAUGGUG	782	CACCAUAA	GCCGAAAAGGCGAGUCAAGGUCU	UCCACACA	1367
2900	GAGUUAUG	G	UGUGACUG	783	CAGUCACA	GCCGAAAAGGCGAGUCAAGGUCU	CAUAAUCU	1368
2916	GUGUGGGA	G	CUGAUGAC	784	GUCAUUCAG	GCCGAAAAGGCGAGUCAAGGUCU	UCCACAC	1369
2932	CUTUUGGG	G	CCAAACCU	785	AGGUUUGG	GCCGAAAAGGCGAGUCAAGGUCU	CCCAAAAG	1370
2956	GGAUCCCA	G	CCCCGGAG	786	CUCCCGGG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGAUCC	1371
2991	AAAGGGGA	G	CGGUCGCC	787	GGCAGCG	GCCGAAAAGGCGAGUCAAGGUCU	UCCCCUUG	1372
2994	GGGAGCG	G	CUGCCCCA	788	UGGGGCG	GCCGAAAAGGCGAGUCAAGGUCU	CGUCUCCC	1373
3003	CUGCCCCA	G	CCCCCAU	789	AUGGGGGG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGGCG	1374
3040	UGAUAUG	G	UCAAUUGU	790	ACAUUUGA	GCCGAAAAGGCGAGUCAAGGUCU	CAUGAUCA	1375
3072	GAAUUGCG	G	CCAAAGUU	791	AUUCUUGG	GCCGAAAAGGCGAGUCAAGGUCU	CGACAUUC	1376
3087	UUCGGGGA	G	UUGGUGUC	792	GACACCAA	GCCGAAAAGGCGAGUCAAGGUCU	UCCGGAA	1377
3091	GGGAGUUG	G	UGUCUGAA	793	UUCAGACA	GCCGAAAAGGCGAGUCAAGGUCU	CAAUCCCC	1378
3112	CCGCAUG	G	CAGGGAC	794	GUUCCUGG	GCCGAAAAGGCGAGUCAAGGUCU	CAUGCGGG	1379
3126	GAUCCCCA	G	CGCUUUGU	795	ACAAAAGG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGGUGU	1380
3136	GUUUGUG	G	UCAUCCAG	796	CUUGAUGA	GCCGAAAAGGCGAGUCAAGGUCU	CACAAAGC	1381
3158	GGACUUGG	G	CCGAGCCA	797	UGGCUUGG	GCCGAAAAGGCGAGUCAAGGUCU	CCAAGUCC	1382
3163	UGGGCCCCA	G	CCAGUCCC	798	GGGACUUG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGCCCCA	1383
3167	CCGAGCCA	G	UCCCCUGG	799	CCAAGGGA	GCCGAAAAGGCGAGUCAAGGUCU	UGGCUUGG	1384
3179	CUUGGACA	G	CAUCCUUC	800	AGAAGGUG	GCCGAAAAGGCGAGUCAAGGUCU	UGUCCNAG	1385
3226	GGGACUUG	G	UGGAUGCU	801	AGCAUCCA	GCCGAAAAGGCGAGUCAAGGUCU	CAGGUCCC	1386
3240	GCUGAGGA	G	UAUCUGGU	802	ACGAGUA	GCCGAAAAGGCGAGUCAAGGUCU	UCCUCNAG	1387
3247	AGUAUCUG	G	UAUCCCCAG	803	CUGGGUA	GCCGAAAAGGCGAGUCAAGGUCU	CAGAUACU	1388
3255	GUACCCCA	G	CAGGGCUU	804	AAAGCCUG	GCCGAAAAGGCGAGUCAAGGUCU	UGGGGUAU	1389
3260	CCAGCAGG	G	CUUGUUCU	805	AGAAGGAG	GCCGAAAAGGCGAGUCAAGGUCU	CCUGGUGG	1390
3287	UGCCCGGG	G	CGCUGGGG	806	CCCCAGCG	GCCGAAAAGGCGAGUCAAGGUCU	CCGGGGCA	1391
3296	CGCUGGGG	G	CAUGGUCC	807	GGACAUUG	GCCGAAAAGGCGAGUCAAGGUCU	CCCCAGCG	1392
3301	GGGGCAUG	G	UCCACAC	808	GUUGUGGA	GCCGAAAAGGCGAGUCAAGGUCU	CAUGGCCC	1393
3312	CACCAACG	G	CACCGCAG	809	CUGCGUGG	GCCGAAAAGGCGAGUCAAGGUCU	CUGGUGUG	1394
3320	GCACCGAG	G	CUCUUA	810	UAGAUAG	GCCGAAAAGGCGAGUCAAGGUCU	UGCGGUGC	1395
3335	UAACAGGA	G	UGGGGUG	811	CACCGCCA	GCCGAAAAGGCGAGUCAAGGUCU	UCCUGGUA	1396
3338	CAGGAGUG	G	CGUGGGG	812	CCCCACCG	GCCGAAAAGGCGAGUCAAGGUCU	CACUCCUG	1397
3341	GAGUGCGG	G	UGGGGACC	813	GUUCCCA	GCCGAAAAGGCGAGUCAAGGUCU	CGCCACUC	1398
3360	ACAUUAGG	G	CCUGAGCC	814	GGCUCACG	GCCGAAAAGGCGAGUCAAGGUCU	CCUAGUGU	1399
3366	GGGUGGA	G	CUTUUGG	815	UCAGAGGG	GCCGAAAAGGCGAGUCAAGGUCU	UCCACCCC	1400
3382	AAAGGAGG	G	CCCCCAGG	816	CCUGGGGG	GCCGAAAAGGCGAGUCAAGGUCU	CUCCUUCU	1401
3390	GGCCCGAG	G	UUCUCCAU	817	AGUGGAGA	GCCGAAAAGGCGAGUCAAGGUCU	CUGGGGGC	1402
3400	CUCCACUG	G	CACCUUCC	818	GGAGGUGG	GCCGAAAAGGCGAGUCAAGGUCU	CAGUGGAG	1403
3415	CCGAAAGG	G	CUGGCUCC	819	GGAGCCAG	GCCGAAAAGGCGAGUCAAGGUCU	CCUUCGGG	1404
3419	AGGGGUG	G	CUCCGAGU	820	CAUCGGAG	GCCGAAAAGGCGAGUCAAGGUCU	CAGCCCCU	1405
3437	AUUGAUG	G	UGACUUGG	821	CCAGGUA	GCCGAAAAGGCGAGUCAAGGUCU	CAUCAAU	1406
3454	GAAUUGGG	G	CAGCCAG	822	CUUGGUGG	GCCGAAAAGGCGAGUCAAGGUCU	CCCCAUUC	1407

Table 59

3457	UGGGGGG G CCAAGGG	823	CCCCUUG	GCCGAAAAGCGAGUCAAAGGUU	UGCCCCCA	1408
3465	GCCAAAGG G CUGCAAAG	824	CUUUGCAG	GCCGAAAAGCGAGUCAAAGGUU	CCUUGGCG	1409
3473	GUUGCAAA G CCUCCCCA	825	UGGGAGG	GCCGAAAAGCGAGUCAAAGGUU	UUUGCAGC	1410
3494	UGACCCCA G CCGUUCAC	826	GUAGAGG	GCCGAAAAGCGAGUCAAAGGUU	UGGGGUCA	1411
3504	CCUUCAGA G CGGUACAG	827	CGUAGCG	GCCGAAAAGCGAGUCAAAGGUU	UGUAGUAG	1412
3507	CUACAGG G UACAGUA	828	UCAUGUA	GCCGAAAAGCGAGUCAAAGGUU	CGUGUJAG	1413
3512	GCGGUACA G UGAGGACC	829	GUUCUUA	GCCGAAAAGCGAGUCAAAGGUU	UGUACCCG	1414
3526	ACCCCAAG G UACCCUUG	830	CAGGGUA	GCCGAAAAGCGAGUCAAAGGUU	UGUGGGGU	1415
3551	GACUGAG G CUACGUUG	831	CAACGUAG	GCCGAAAAGCGAGUCAAAGGUU	CAUACAUC	1416
3556	AUUGGUAG G UUGCCCCC	832	GGGGCAA	GCCGAAAAGCGAGUCAAAGGUU	GUAGCCAU	1417
3575	GACCUAGA G CCCCCAGC	833	GUUGGGG	GCCGAAAAGCGAGUCAAAGGUU	UGCAGGUU	1418
3582	AGCCCCCA G CUGUAUA	834	UAUUCAG	GCCGAAAAGCGAGUCAAAGGUU	UGGGGGGU	1419
3600	GUGAACCA G CCAGAUUG	835	ACAUUCUG	GCCGAAAAGCGAGUCAAAGGUU	UGGUUCCAC	1420
3612	GALUGUGG G CCCCCAGC	836	GGUUGGG	GCCGAAAAGCGAGUCAAAGGUU	CGAACUUC	1421
3618	CGCCCCCA G CCCCCUUC	837	GAUGGGG	GCCGAAAAGCGAGUCAAAGGUU	UGGGGGCG	1422
3638	CGAGAGGG G CCCCCUUC	838	CGAGAGGG	GCCGAAAAGCGAGUCAAAGGUU	CCUUCUGG	1423
3665	ACUUGUGG G UGCCACUC	839	GAGUGGA	GCCGAAAAGCGAGUCAAAGGUU	CGACAGGU	1424
3681	CUGGAAAG G CCGAAGAC	840	GUUCUGG	GCCGAAAAGCGAGUCAAAGGUU	CUUUCAG	1425
3712	AGAUUGGG G UGUCAAA	841	UUUGACGA	GCCGAAAAGCGAGUCAAAGGUU	CCCAUUCU	1426
3715	AUGGGGUG G UCAAGAAC	842	GUUUUGA	GCCGAAAAGCGAGUCAAAGGUU	GACCCCAU	1427
3724	UUAAGAGC G UUUUUUCC	843	GGCAAAA	GCCGAAAAGCGAGUCAAAGGUU	GUUUUJGA	1428
3740	CUUUGGGG G UGGGUUGG	844	CCACGGCA	GCCGAAAAGCGAGUCAAAGGUU	CCCCAAAG	1429
3745	GGGUUGCC G UUGAGAAC	845	GUUUCUA	GCCGAAAAGCGAGUCAAAGGUU	GGCACCCC	1430
3759	AACCCCGA G UACUUGAC	846	GUCAAGUA	GCCGAAAAGCGAGUCAAAGGUU	UCGGGGUU	1431
3781	AGGAGGGA G CUGCCCCU	847	AGGGCGAG	GCCGAAAAGCGAGUCAAAGGUU	UUCUCCCC	1432
3792	GCCCCUCA G CCCCACCC	848	GGGUUGGG	GCCGAAAAGCGAGUCAAAGGUU	UGAGGGGC	1433
3815	UGCCUUGA G CCGAGCTU	849	AGGUUGGG	GCCGAAAAGCGAGUCAAAGGUU	UGAAGGCA	1434
3820	UCAGCCCC G CCUUCGAC	850	GUCGAAG	GCCGAAAAGCGAGUCAAAGGUU	UGGGUUGA	1435
3861	CCACCAAG G CGGGGGGG	851	GCCCCCG	GCCGAAAAGCGAGUCAAAGGUU	UUGGUJGG	1436
3868	AGCGGGGG G CUCCACCC	852	GGUUGGAG	GCCGAAAAGCGAGUCAAAGGUU	CCCCCGCU	1437
3878	UCCACCCA G CACCUUCA	853	UGAAGGUG	GCCGAAAAGCGAGUCAAAGGUU	UGGGUUGA	1438
3901	CACUJAGG G CAGAGAAC	854	GUUCUUG	GCCGAAAAGCGAGUCAAAGGUU	CGUAGGUG	1439
3915	AACCCAGA G UACCUUGG	855	CCGAGGUA	GCCGAAAAGCGAGUCAAAGGUU	UUGGGGUU	1440
3923	GUACCUUG G UCUUGAGC	856	CGUCCAGA	GCCGAAAAGCGAGUCAAAGGUU	CCAGGUAC	1441
3931	GUUCGAGG G UGCCAGUG	857	CACUGGCA	GCCGAAAAGCGAGUCAAAGGUU	GUCCAGAC	1442
3937	ACGUGCCA G UGUAGACC	858	GGUUCACA	GCCGAAAAGCGAGUCAAAGGUU	UGGACCGU	1443
3951	ACCAAGAG G CCAAGUCC	859	GGAUUGG	GCCGAAAAGCGAGUCAAAGGUU	CUUUGGUU	1444
3956	AAGGCCAA G UGGCGAGA	860	UCUGCGGA	GCCGAAAAGCGAGUCAAAGGUU	UUGGCCUU	1445
3966	CCGACAGA G CCGUGAUG	861	CAUCAGGG	GCCGAAAAGCGAGUCAAAGGUU	UUUCUGCG	1446
3987	CUACGGGA G CAGGGAGG	862	CUUCCUUG	GCCGAAAAGCGAGUCAAAGGUU	UCCUUGAG	1447
3996	CAGGGAAG G CCUGACUU	863	AAGUACGG	GCCGAAAAGCGAGUCAAAGGUU	CUUCCUUG	1448
4011	UUCUUGUG G CAUACAAG	864	UCUUGAUG	GCCGAAAAGCGAGUCAAAGGUU	CAGCA GAA	1449
4021	AUCAAAGG G UGGGAGGG	865	CCUCCUCA	GCCGAAAAGCGAGUCAAAGGUU	CUUUGAU	1450
4029	GUJGGAGG G CCGUCCGA	866	UCGCGAGG	GCCGAAAAGCGAGUCAAAGGUU	CCUCCAC	1451
4100	CUUGCUUA G UUUCCAGA	867	UCUGGGAA	GCCGAAAAGCGAGUCAAAGGUU	UCAAGCAG	1452
4111	CCCAAGUG G UGGGAAGG	868	CCUUCAG	GCCGAAAAGCGAGUCAAAGGUU	CAUUCUGG	1453
4121	UGSAAAGG G UCCAGGCU	869	AGGCUUGA	GCCGAAAAGCGAGUCAAAGGUU	CCUUCUA	1454

Table 59

4126	GGGGUCCA	G	CCUCGUUG	870	CAACGAGG	GCCGAAAGGCGAGUCAAGGUCU	UGGACCCC	1455
4131	CCAGCCTC	G	UUUGAAGA	871	UCUUCCAA	GCCGAAAGGCGAGUCAAGGUCU	GAGGCUUG	1456
4146	GAGGAACA	G	CACUGGGG	872	CCCCAGUG	GCCGAAAGGCGAGUCAAGGUCU	UGUUCUJC	1457
4156	ACUGGGGA	G	UCUUGUGG	873	CACAAAGA	GCCGAAAGGCGAGUCAAGGUCU	UCCCCAGU	1458
4174	AUUCUGAG	G	CCUUGCCC	874	GGGCAGGG	GCCGAAAGGCGAGUCAAGGUCU	CUAGAGAU	1459
4197	ACUCUAGG	G	UCCAGUGG	875	CCACUGGA	GCCGAAAGGCGAGUCAAGGUCU	CCUAGAGU	1460
4202	AGGGUCCA	G	UGGAUGCC	876	GGCAUCCA	GCCGAAAGGCGAGUCAAGGUCU	UGGACCCU	1461
4214	AUGGCACA	G	CCAGCCTU	877	AAGCUGGG	GCCGAAAGGCGAGUCAAGGUCU	UGUGGCAU	1462
4219	ACAGCCCA	G	CUUGGCCC	878	GGGCCAAG	GCCGAAAGGCGAGUCAAGGUCU	UGGGCUUG	1463
4224	CCAGCUUG	G	CCCUUCC	879	GGAAAGGG	GCCGAAAGGCGAGUCAAGGUCU	CAAGCUUG	1464
4246	GAUCCUGG	G	UACUGAAA	880	UUUCAGUA	GCCGAAAGGCGAGUCAAGGUCU	CCAGGAGC	1465
4255	UACUGAAA	G	CCUAGGGG	881	CCCUAAGG	GCCGAAAGGCGAGUCAAGGUCU	UUUCAGUA	1466
4266	UUAGGGAA	G	CUGGCCUG	882	CAGGCCAG	GCCGAAAGGCGAGUCAAGGUCU	UUCCCUAA	1467
4270	GGAAGCUG	G	CCUGAGAG	883	CUUCAGG	GCCGAAAGGCGAGUCAAGGUCU	CAGCUUCC	1468
4284	GAGGGGAA	G	CGGCCCUA	884	UAGGCGCG	GCCGAAAGGCGAGUCAAGGUCU	UUCCCCJC	1469
4287	GGGAAGCG	G	CCCUAAGG	885	CCUUAAGG	GCCGAAAGGCGAGUCAAGGUCU	CGCUUCCC	1470
4298	CUAAGGGA	G	UGUCUAGG	886	CUUAGACA	GCCGAAAGGCGAGUCAAGGUCU	UCCCCUAG	1471
4314	GAAACAAA	G	CGACCCAU	887	AUGGGUUG	GCCGAAAGGCGAGUCAAGGUCU	UUUUUUCJ	1472
4346	GAAACCUA	G	UACUGCCC	888	GGGCAGUA	GCCGAAAGGCGAGUCAAGGUCU	UAUUUUJC	1473
4372	AAGGAACA	G	CAUUGGUG	889	CACCAUUG	GCCGAAAGGCGAGUCAAGGUCU	UGUUCUUJ	1474
4378	CAGCAUUG	G	UGUCAGUA	890	UACUGACA	GCCGAAAGGCGAGUCAAGGUCU	CAUUGCUJ	1475
4384	UGGUGUCA	G	UAUCCAGG	891	CCUGGAUA	GCCGAAAGGCGAGUCAAGGUCU	UGACACCA	1476
4392	GUAUCCAG	G	CUUUGUAC	892	GUACAAGG	GCCGAAAGGCGAGUCAAGGUCU	CUUGAUAC	1477
4404	UGUACAGA	G	UGCUUUUC	893	GAAAAGCA	GCCGAAAGGCGAGUCAAGGUCU	UCUGUACA	1478
4419	UCUGUUUA	G	UUUUUACU	894	AGUAAATA	GCCGAAAGGCGAGUCAAGGUCU	UAAACAGA	1479

Input Sequence = HSERB2R. Cut Site = G/Y

Stem Length = 8. Core Sequence = GCCGAAAGGCGAGUCAAGGUCU

HSERB2R (Human c-erb-B-2 mRNA; 4473 bp)

Table 60

Table 60: Substrate Specificity for Class I Ribozymes

Substrate sequence	1-9t mutation	k_{rel}
5'-GCCGU G GGUUGCAC ACCUUUCC-3'	w.t.	1.00
5'-GCCGU G GGUUGCAC ACCUUUCC-3'	A57G	2.5
5'-GCCGA G GGUUGCAC ACCUUUCC-3'	A57U	0.24
5'-GCCGC G GGUUGCAC ACCUUUCC-3'	A57G	0.66
5'-GCCGG G GGUUGCAC ACCUUUCC-3'	A57C	0.57
5'-GCCGU U GGUUGCAC ACCUUUCC-3'	w.t.	0.17
5'-GCCGU A GGUUGCAC ACCUUUCC-3'	w.t.	n.d.
5'-GCCGU C GGUUGCAC ACCUUUCC-3'	w.t.	n.d.
5'-GCCGU G GGUUGCAC ACCUUUCC-3'	C16U	0.98
5'-GCCGU G UGUUGCAC ACCUUUCC-3'	C16G	n.d.
5'-GCCGU G UGUUGCAC ACCUUUCC-3'	C16A	0.65
5'-GCCGU G AGUUGCAC ACCUUUCC-3'	C16U	0.45
5'-GCCGU G CGUUGCAC ACCUUUCC-3'	C16G	0.73
5'-GCCGU G GGUUGCAC ACCUUU-3'	w.t.	0.89
5'-GCCGU G GGUUGCAC ACCU-3'	w.t.	1.0
5'-GCCGU G GGUUGCAC AC-3'	w.t.	0.67

Table 62

Table 62: Human Her2 Class II Ribozyme and Target Sequence

R#H	NT Pos	Substrate	Seq ID #	Ribozyme Sequence	Seq ID #
19552	433	GCAUUC G CUGAUA	7	U ₁ U ₂ U ₃ U ₄ U ₅ U ₆ U ₇ U ₈ U ₉ U ₁₀ U ₁₁ U ₁₂ U ₁₃ U ₁₄ U ₁₅ U ₁₆ U ₁₇ U ₁₈ U ₁₉ U ₂₀ U ₂₁ U ₂₂ U ₂₃ U ₂₄ U ₂₅ U ₂₆ U ₂₇ U ₂₈ U ₂₉ U ₃₀ U ₃₁ U ₃₂ U ₃₃ U ₃₄ U ₃₅ U ₃₆ U ₃₇ U ₃₈ U ₃₉ U ₄₀ U ₄₁ U ₄₂ U ₄₃ U ₄₄ U ₄₅ U ₄₆ U ₄₇ U ₄₈ U ₄₉ U ₅₀ U ₅₁ U ₅₂ U ₅₃ U ₅₄ U ₅₅ U ₅₆ U ₅₇ U ₅₈ U ₅₉ U ₆₀ U ₆₁ U ₆₂ U ₆₃ U ₆₄ U ₆₅ U ₆₆ U ₆₇ U ₆₈ U ₆₉ U ₇₀ U ₇₁ U ₇₂ U ₇₃ U ₇₄ U ₇₅ U ₇₆ U ₇₇ U ₇₈ U ₇₉ U ₈₀ U ₈₁ U ₈₂ U ₈₃ U ₈₄ U ₈₅ U ₈₆ U ₈₇ U ₈₈ U ₈₉ U ₉₀ U ₉₁ U ₉₂ U ₉₃ U ₉₄ U ₉₅ U ₉₆ U ₉₇ U ₉₈ U ₉₉ U ₁₀₀ U ₁₀₁ U ₁₀₂ U ₁₀₃ U ₁₀₄ U ₁₀₅ U ₁₀₆ U ₁₀₇ U ₁₀₈ U ₁₀₉ U ₁₁₀ U ₁₁₁ U ₁₁₂ U ₁₁₃ U ₁₁₄ U ₁₁₅ U ₁₁₆ U ₁₁₇ U ₁₁₈ U ₁₁₉ U ₁₂₀ U ₁₂₁ U ₁₂₂ U ₁₂₃ U ₁₂₄ U ₁₂₅ U ₁₂₆ U ₁₂₇ U ₁₂₈ U ₁₂₉ U ₁₃₀ U ₁₃₁ U ₁₃₂ U ₁₃₃ U ₁₃₄ U ₁₃₅ U ₁₃₆ U ₁₃₇ U ₁₃₈ U ₁₃₉ U ₁₄₀ U ₁₄₁ U ₁₄₂ U ₁₄₃ U ₁₄₄ U ₁₄₅ U ₁₄₆ U ₁₄₇ U ₁₄₈ U ₁₄₉ U ₁₅₀ U ₁₅₁ U ₁₅₂ U ₁₅₃ U ₁₅₄ U ₁₅₅ U ₁₅₆ U ₁₅₇ U ₁₅₈ U ₁₅₉ U ₁₆₀ U ₁₆₁ U ₁₆₂ U ₁₆₃ U ₁₆₄ U ₁₆₅ U ₁₆₆ U ₁₆₇ U ₁₆₈ U ₁₆₉ U ₁₇₀ U ₁₇₁ U ₁₇₂ U ₁₇₃ U ₁₇₄ U ₁₇₅ U ₁₇₆ U ₁₇₇ U ₁₇₈ U ₁₇₉ U ₁₈₀ U ₁₈₁ U ₁₈₂ U ₁₈₃ U ₁₈₄ U ₁₈₅ U ₁₈₆ U ₁₈₇ U ₁₈₈ U ₁₈₉ U ₁₉₀ U ₁₉₁ U ₁₉₂ U ₁₉₃ U ₁₉₄ U ₁₉₅ U ₁₉₆ U ₁₉₇ U ₁₉₈ U ₁₉₉ U ₂₀₀ U ₂₀₁ U ₂₀₂ U ₂₀₃ U ₂₀₄ U ₂₀₅ U ₂₀₆ U ₂₀₇ U ₂₀₈ U ₂₀₉ U ₂₁₀ U ₂₁₁ U ₂₁₂ U ₂₁₃ U ₂₁₄ U ₂₁₅ U ₂₁₆ U ₂₁₇ U ₂₁₈ U ₂₁₉ U ₂₂₀ U ₂₂₁ U ₂₂₂ U ₂₂₃ U ₂₂₄ U ₂₂₅ U ₂₂₆ U ₂₂₇ U ₂₂₈ U ₂₂₉ U ₂₃₀ U ₂₃₁ U ₂₃₂ U ₂₃₃ U ₂₃₄ U ₂₃₅ U ₂₃₆ U ₂₃₇ U ₂₃₈ U ₂₃₉ U ₂₄₀ U ₂₄₁ U ₂₄₂ U ₂₄₃ U ₂₄₄ U ₂₄₅ U ₂₄₆ U ₂₄₇ U ₂₄₈ U ₂₄₉ U ₂₅₀ U ₂₅₁ U ₂₅₂ U ₂₅₃ U ₂₅₄ U ₂₅₅ U ₂₅₆ U ₂₅₇ U ₂₅₈ U ₂₅₉ U ₂₆₀ U ₂₆₁ U ₂₆₂ U ₂₆₃ U ₂₆₄ U ₂₆₅ U ₂₆₆ U ₂₆₇ U ₂₆₈ U ₂₆₉ U ₂₇₀ U ₂₇₁ U ₂₇₂ U ₂₇₃ U ₂₇₄ U ₂₇₅ U ₂₇₆ U ₂₇₇ U ₂₇₈ U ₂₇₉ U ₂₈₀ U ₂₈₁ U ₂₈₂ U ₂₈₃ U ₂₈₄ U ₂₈₅ U ₂₈₆ U ₂₈₇ U ₂₈₈ U ₂₈₉ U ₂₉₀ U ₂₉₁ U ₂₉₂ U ₂₉₃ U ₂₉₄ U ₂₉₅ U ₂₉₆ U ₂₉₇ U ₂₉₈ U ₂₉₉ U ₃₀₀ U ₃₀₁ U ₃₀₂ U ₃₀₃ U ₃₀₄ U ₃₀₅ U ₃₀₆ U ₃₀₇ U ₃₀₈ U ₃₀₉ U ₃₁₀ U ₃₁₁ U ₃₁₂ U ₃₁₃ U ₃₁₄ U ₃₁₅ U ₃₁₆ U ₃₁₇ U ₃₁₈ U ₃₁₉ U ₃₂₀ U ₃₂₁ U ₃₂₂ U ₃₂₃ U ₃₂₄ U ₃₂₅ U ₃₂₆ U ₃₂₇ U ₃₂₈ U ₃₂₉ U ₃₃₀ U ₃₃₁ U ₃₃₂ U ₃₃₃ U ₃₃₄ U ₃₃₅ U ₃₃₆ U ₃₃₇ U ₃₃₈ U ₃₃₉ U ₃₄₀ U ₃₄₁ U ₃₄₂ U ₃₄₃ U ₃₄₄ U ₃₄₅ U ₃₄₆ U ₃₄₇ U ₃₄₈ U ₃₄₉ U ₃₅₀ U ₃₅₁ U ₃₅₂ U ₃₅₃ U ₃₅₄ U ₃₅₅ U ₃₅₆ U ₃₅₇ U ₃₅₈ U ₃₅₉ U ₃₆₀ U ₃₆₁ U ₃₆₂ U ₃₆₃ U ₃₆₄ U ₃₆₅ U ₃₆₆ U ₃₆₇ U ₃₆₈ U ₃₆₉ U ₃₇₀ U ₃₇₁ U ₃₇₂ U ₃₇₃ U ₃₇₄ U ₃₇₅ U ₃₇₆ U ₃₇₇ U ₃₇₈ U ₃₇₉ U ₃₈₀ U ₃₈₁ U ₃₈₂ U ₃₈₃ U ₃₈₄ U ₃₈₅ U ₃₈₆ U ₃₈₇ U ₃₈₈ U ₃₈₉ U ₃₉₀ U ₃₉₁ U ₃₉₂ U ₃₉₃ U ₃₉₄ U ₃₉₅ U ₃₉₆ U ₃₉₇ U ₃₉₈ U ₃₉₉ U ₄₀₀ U ₄₀₁ U ₄₀₂ U ₄₀₃ U ₄₀₄ U ₄₀₅ U ₄₀₆ U ₄₀₇ U ₄₀₈ U ₄₀₉ U ₄₁₀ U ₄₁₁ U ₄₁₂ U ₄₁₃ U ₄₁₄ U ₄₁₅ U ₄₁₆ U ₄₁₇ U ₄₁₈ U ₄₁₉ U ₄₂₀ U ₄₂₁ U ₄₂₂ U ₄₂₃ U ₄₂₄ U ₄₂₅ U ₄₂₆ U ₄₂₇ U ₄₂₈ U ₄₂₉ U ₄₃₀ U ₄₃₁ U ₄₃₂ U ₄₃₃ U ₄₃₄ U ₄₃₅ U ₄₃₆ U ₄₃₇ U ₄₃₈ U ₄₃₉ U ₄₄₀ U ₄₄₁ U ₄₄₂ U ₄₄₃ U ₄₄₄ U ₄₄₅ U ₄₄₆ U ₄₄₇ U ₄₄₈ U ₄₄₉ U ₄₅₀ U ₄₅₁ U ₄₅₂ U ₄₅₃ U ₄₅₄ U ₄₅₅ U ₄₅₆ U ₄₅₇ U ₄₅₈ U ₄₅₉ U ₄₆₀ U ₄₆₁ U ₄₆₂ U ₄₆₃ U ₄₆₄ U ₄₆₅ U ₄₆₆ U ₄₆₇ U ₄₆₈ U ₄₆₉ U ₄₇₀ U ₄₇₁ U ₄₇₂ U ₄₇₃ U ₄₇₄ U ₄₇₅ U ₄₇₆ U ₄₇₇ U ₄₇₈ U ₄₇₉ U ₄₈₀ U ₄₈₁ U ₄₈₂ U ₄₈₃ U ₄₈₄ U ₄₈₅ U ₄₈₆ U ₄₈₇ U ₄₈₈ U ₄₈₉ U ₄₉₀ U ₄₉₁ U ₄₉₂ U ₄₉₃ U ₄₉₄ U ₄₉₅ U ₄₉₆ U ₄₉₇ U ₄₉₈ U ₄₉₉ U ₅₀₀ U ₅₀₁ U ₅₀₂ U ₅₀₃ U ₅₀₄ U ₅₀₅ U ₅₀₆ U ₅₀₇ U ₅₀₈ U ₅₀₉ U ₅₁₀ U ₅₁₁ U ₅₁₂ U ₅₁₃ U ₅₁₄ U ₅₁₅ U ₅₁₆ U ₅₁₇ U ₅₁₈ U ₅₁₉ U ₅₂₀ U ₅₂₁ U ₅₂₂ U ₅₂₃ U ₅₂₄ U ₅₂₅ U ₅₂₆ U ₅₂₇ U ₅₂₈ U ₅₂₉ U ₅₃₀ U ₅₃₁ U ₅₃₂ U ₅₃₃ U ₅₃₄ U ₅₃₅ U ₅₃₆ U ₅₃₇ U ₅₃₈ U ₅₃₉ U ₅₄₀ U ₅₄₁ U ₅₄₂ U ₅₄₃ U ₅₄₄ U ₅₄₅ U ₅₄₆ U ₅₄₇ U ₅₄₈ U ₅₄₉ U ₅₅₀ U ₅₅₁ U ₅₅₂ U ₅₅₃ U ₅₅₄ U ₅₅₅ U ₅₅₆ U ₅₅₇ U ₅₅₈ U ₅₅₉ U ₅₆₀ U ₅₆₁ U ₅₆₂ U ₅₆₃ U ₅₆₄ U ₅₆₅ U ₅₆₆ U ₅₆₇ U ₅₆₈ U ₅₆₉ U ₅₇₀ U ₅₇₁ U ₅₇₂ U ₅₇₃ U ₅₇₄ U ₅₇₅ U ₅₇₆ U ₅₇₇ U ₅₇₈ U ₅₇₉ U ₅₈₀ U ₅₈₁ U ₅₈₂ U ₅₈₃ U ₅₈₄ U ₅₈₅ U ₅₈₆ U ₅₈₇ U ₅₈₈ U ₅₈₉ U ₅₉₀ U ₅₉₁ U ₅₉₂ U ₅₉₃ U ₅₉₄ U ₅₉₅ U ₅₉₆ U ₅₉₇ U ₅₉₈ U ₅₉₉ U ₆₀₀ U ₆₀₁ U ₆₀₂ U ₆₀₃ U ₆₀₄ U ₆₀₅ U ₆₀₆ U ₆₀₇ U ₆₀₈ U ₆₀₉ U ₆₁₀ U ₆₁₁ U ₆₁₂ U ₆₁₃ U ₆₁₄ U ₆₁₅ U ₆₁₆ U ₆₁₇ U ₆₁₈ U ₆₁₉ U ₆₂₀ U ₆₂₁ U ₆₂₂ U ₆₂₃ U ₆₂₄ U ₆₂₅ U ₆₂₆ U ₆₂₇ U ₆₂₈ U ₆₂₉ U ₆₃₀ U ₆₃₁ U ₆₃₂ U ₆₃₃ U ₆₃₄ U ₆₃₅ U ₆₃₆ U ₆₃₇ U ₆₃₈ U ₆₃₉ U ₆₄₀ U ₆₄₁ U ₆₄₂ U ₆₄₃ U ₆₄₄ U ₆₄₅ U ₆₄₆ U ₆₄₇ U ₆₄₈ U ₆₄₉ U ₆₅₀ U ₆₅₁ U ₆₅₂ U ₆₅₃ U ₆₅₄ U ₆₅₅ U ₆₅₆ U ₆₅₇ U ₆₅₈ U ₆₅₉ U ₆₆₀ U ₆₆₁ U ₆₆₂ U ₆₆₃ U ₆₆₄ U ₆₆₅ U ₆₆₆ U ₆₆₇ U ₆₆₈ U ₆₆₉ U ₆₇₀ U ₆₇₁ U ₆₇₂ U ₆₇₃ U ₆₇₄ U ₆₇₅ U ₆₇₆ U ₆₇₇ U ₆₇₈ U ₆₇₉ U ₆₈₀ U ₆₈₁ U ₆₈₂ U ₆₈₃ U ₆₈₄ U ₆₈₅ U ₆₈₆ U ₆₈₇ U ₆₈₈ U ₆₈₉ U ₆₉₀ U ₆₉₁ U ₆₉₂ U ₆₉₃ U ₆₉₄ U ₆₉₅ U ₆₉₆ U ₆₉₇ U ₆₉₈ U ₆₉₉ U ₇₀₀ U ₇₀₁ U ₇₀₂ U ₇₀₃ U ₇₀₄ U ₇₀₅ U ₇₀₆ U ₇₀₇ U ₇₀₈ U ₇₀₉ U ₇₁₀ U ₇₁₁ U ₇₁₂ U ₇₁₃ U ₇₁₄ U ₇₁₅ U ₇₁₆ U ₇₁₇ U ₇₁₈ U ₇₁₉ U ₇₂₀ U ₇₂₁ U ₇₂₂ U ₇₂₃ U ₇₂₄ U ₇₂₅ U ₇₂₆ U ₇₂₇ U ₇₂₈ U ₇₂₉ U ₇₃₀ U ₇₃₁ U ₇₃₂ U ₇₃₃ U ₇₃₄ U ₇₃₅ U ₇₃₆ U ₇₃₇ U ₇₃₈ U ₇₃₉ U ₇₄₀ U ₇₄₁ U ₇₄₂ U ₇₄₃ U ₇₄₄ U ₇₄₅ U ₇₄₆ U ₇₄₇ U ₇₄₈ U ₇₄₉ U ₇₅₀ U ₇₅₁ U ₇₅₂ U ₇₅₃ U ₇₅₄ U ₇₅₅ U ₇₅₆ U ₇₅₇ U ₇₅₈ U ₇₅₉ U ₇₆₀ U ₇₆₁ U ₇₆₂ U ₇₆₃ U ₇₆₄ U ₇₆₅ U ₇₆₆ U ₇₆₇ U ₇₆₈ U ₇₆₉ U ₇₇₀ U ₇₇₁ U ₇₇₂ U ₇₇₃ U ₇₇₄ U ₇₇₅ U ₇₇₆ U ₇₇₇ U ₇₇₈ U ₇₇₉ U ₇₈₀ U ₇₈₁ U ₇₈₂ U ₇₈₃ U ₇₈₄ U ₇₈₅ U ₇₈₆ U ₇₈₇ U ₇₈₈ U ₇₈₉ U ₇₉₀ U ₇₉₁ U ₇₉₂ U ₇₉₃ U ₇₉₄ U ₇₉₅ U ₇₉₆ U ₇₉₇ U ₇₉₈ U ₇₉₉ U ₈₀₀ U ₈₀₁ U ₈₀₂ U ₈₀₃ U ₈₀₄ U ₈₀₅ U ₈₀₆ U ₈₀₇ U ₈₀₈ U ₈₀₉ U ₈₁₀ U ₈₁₁ U ₈₁₂ U ₈₁₃ U ₈₁₄ U ₈₁₅ U ₈₁₆ U ₈₁₇ U ₈₁₈ U ₈₁₉ U ₈₂₀ U ₈₂₁ U ₈₂₂ U ₈₂₃ U ₈₂₄ U ₈₂₅ U ₈₂₆ U ₈₂₇ U ₈₂₈ U ₈₂₉ U ₈₃₀ U ₈₃₁ U ₈₃₂ U ₈₃₃ U ₈₃₄ U ₈₃₅ U ₈₃₆ U ₈₃₇ U ₈₃₈ U ₈₃₉ U ₈₄₀ U ₈₄₁ U ₈₄₂ U ₈₄₃ U ₈₄₄ U ₈₄₅ U ₈₄₆ U ₈₄₇ U ₈₄₈ U ₈₄₉ U ₈₅₀ U ₈₅₁ U ₈₅₂ U ₈₅₃ U ₈₅₄ U ₈₅₅ U ₈₅₆ U ₈₅₇ U ₈₅₈ U ₈₅₉ U ₈₆₀ U ₈₆₁ U ₈₆₂ U ₈₆₃ U ₈₆₄ U ₈₆₅ U ₈₆₆ U ₈₆₇ U ₈₆₈ U ₈₆₉ U ₈₇₀ U ₈₇₁ U ₈₇₂ U ₈₇₃ U ₈₇₄ U ₈₇₅ U ₈₇₆ U ₈₇₇ U ₈₇₈ U ₈₇₉ U ₈₈₀ U ₈₈₁ U ₈₈₂ U ₈₈₃ U ₈₈₄ U ₈₈₅ U ₈₈₆ U ₈₈₇ U ₈₈₈ U ₈₈₉ U ₈₉₀ U ₈₉₁ U ₈₉₂ U ₈₉₃ U ₈₉₄ U ₈₉₅ U ₈₉₆ U ₈₉₇ U ₈₉₈ U ₈₉₉ U ₉₀₀ U ₉₀₁ U ₉₀₂ U ₉₀₃ U ₉₀₄ U ₉₀₅ U ₉₀₆ U ₉₀₇ U ₉₀₈ U ₉₀₉ U ₉₁₀ U ₉₁₁ U ₉₁₂ U ₉₁₃ U ₉₁₄ U ₉₁₅ U ₉₁₆ U ₉₁₇ U ₉₁₈ U ₉₁₉ U ₉₂₀ U ₉₂₁ U ₉₂₂ U ₉₂₃ U ₉₂₄ U ₉₂₅ U ₉₂₆ U ₉₂₇ U ₉₂₈ U ₉₂₉ U ₉₃₀ U ₉₃₁ U ₉₃₂ U ₉₃₃ U ₉₃₄ U ₉₃₅ U ₉₃₆ U ₉₃₇ U ₉₃₈ U ₉₃₉ U ₉₄₀ U ₉₄₁ U ₉₄₂ U ₉₄₃ U ₉₄₄ U ₉₄₅ U ₉₄₆ U ₉₄₇ U ₉₄₈ U ₉₄₉ U ₉₅₀ U ₉₅₁ U ₉₅₂ U ₉₅₃ U ₉₅₄ U ₉₅₅ U ₉₅₆ U ₉₅₇ U ₉₅₈ U ₉₅₉ U ₉₆₀ U ₉₆₁ U ₉₆₂ U ₉₆₃ U ₉₆₄ U ₉₆₅ U ₉₆₆ U ₉₆₇ U ₉₆₈ U ₉₆₉ U ₉₇₀ U ₉₇₁ U ₉₇₂ U ₉₇₃ U ₉₇₄ U ₉₇₅ U ₉₇₆ U ₉₇₇ U ₉₇₈ U ₉₇₉ U ₉₈₀ U ₉₈₁ U ₉₈₂ U ₉₈₃ U ₉₈₄ U ₉₈₅ U ₉₈₆ U ₉₈₇ U ₉₈₈ U ₉₈₉ U ₉₉₀ U ₉₉₁ U ₉₉₂ U ₉₉₃ U ₉₉₄ U ₉₉₅ U ₉₉₆ U ₉₉₇ U ₉₉₈ U ₉₉₉ U ₁₀₀₀ U ₁₀₀₁ U ₁₀₀₂ U ₁₀₀₃ U ₁₀₀₄ U ₁₀₀₅ U ₁₀₀₆ U ₁₀₀₇ U ₁₀₀₈ U ₁₀₀₉ U ₁₀₁₀ U ₁₀₁₁ U ₁₀₁₂ U ₁₀₁₃ U ₁₀₁₄ U ₁₀₁₅ U ₁₀₁₆ U ₁₀₁₇ U ₁₀₁₈ U ₁₀₁₉ U ₁₀₂₀ U ₁₀₂₁ U ₁₀₂₂ U ₁₀₂₃ U ₁₀₂₄ U ₁₀₂₅ U ₁₀₂₆ U ₁₀₂₇ U ₁₀₂₈ U ₁₀₂₉ U ₁₀₃₀ U ₁₀₃₁ U ₁₀₃₂ U ₁₀₃₃ U ₁₀₃₄ U ₁₀₃₅ U ₁₀₃₆ U ₁₀₃₇ U ₁₀₃₈ U ₁₀₃₉ U ₁₀₄₀ U ₁₀₄₁ U ₁₀₄₂ U ₁₀₄₃ U ₁₀₄₄ U ₁₀₄₅ U ₁₀₄₆ U ₁₀₄₇ U ₁₀₄₈ U ₁₀₄₉ U ₁₀₅₀ U ₁₀₅₁ U ₁₀₅₂ U ₁₀₅₃ U ₁₀₅₄ U ₁₀₅₅ U ₁₀₅₆ U ₁₀₅₇ U ₁₀₅₈ U ₁₀₅₉ U ₁₀₆₀ U ₁₀₆₁ U ₁₀₆₂ U ₁₀₆₃ U ₁₀₆₄ U ₁₀₆₅ U ₁₀₆₆ U ₁₀₆₇ U ₁₀₆₈ U ₁₀₆₉ U ₁₀₇₀ U ₁₀₇₁ U ₁₀₇₂ U ₁₀₇₃ U ₁₀₇₄ U ₁₀₇₅ U ₁₀₇₆ U ₁₀₇₇ U ₁₀₇₈ U ₁₀₇₉ U ₁₀₈₀ U ₁₀₈₁ U ₁₀₈₂ U ₁₀₈₃ U ₁₀₈₄ U ₁₀₈₅ U ₁₀₈₆ U ₁₀₈₇ U ₁₀₈₈ U ₁₀₈₉ U ₁₀₉₀ U ₁₀₉₁ U ₁₀₉₂ U ₁₀₉₃ U ₁₀₉₄ U ₁₀₉₅ U ₁₀₉₆ U ₁₀₉₇ U ₁₀₉₈ U ₁₀₉₉ U ₁₁₀₀ U ₁₁₀₁ U ₁₁₀₂ U ₁₁₀₃ U ₁₁₀₄ U ₁₁₀₅ U ₁₁₀₆ U ₁₁₀₇ U ₁₁₀₈ U ₁₁₀₉ U ₁₁₁₀ U ₁₁₁₁ U ₁₁₁₂ U ₁₁₁₃ U ₁₁₁₄ U ₁₁₁₅ U ₁₁₁₆ U ₁₁₁₇ U ₁₁₁₈ U ₁₁₁₉ U ₁₁₂₀ U ₁₁₂₁ U ₁₁₂₂ U ₁₁₂₃ U ₁₁₂₄ U ₁₁₂₅ U ₁₁₂₆ U ₁₁₂₇ U ₁₁₂₈ U ₁₁₂₉ U ₁₁₃₀ U ₁₁₃₁ U ₁₁₃₂ U ₁₁₃₃ U ₁₁₃₄ U ₁₁₃₅ U ₁₁₃₆ U ₁₁₃₇ U ₁₁₃₈ U ₁₁₃₉ U ₁₁₄₀ U ₁₁₄₁ U ₁₁₄₂ U ₁₁₄₃ U ₁₁₄₄ U ₁₁₄₅ U ₁₁₄₆ U ₁₁₄₇ U ₁₁₄₈ U ₁₁₄₉ U ₁₁₅₀ U ₁₁₅₁ U ₁₁₅₂ U ₁₁₅₃ U ₁₁₅₄ U ₁₁₅₅ U ₁₁₅₆ U ₁₁₅₇ U ₁₁₅₈ U ₁₁₅₉ U ₁₁₆₀ U ₁₁₆₁ U ₁₁₆₂ U ₁₁₆₃ U ₁₁₆₄ U ₁₁₆₅ U ₁₁₆₆ U ₁₁₆₇ U ₁₁₆₈ U ₁₁₆₉ U ₁₁₇₀ U ₁₁₇₁ U ₁₁₇₂ U ₁₁₇₃ U ₁₁₇₄ U ₁₁₇₅ U ₁₁₇₆ U ₁₁₇₇ U ₁₁₇₈ U ₁₁₇₉ U ₁₁₈₀ U ₁₁₈₁ U ₁₁₈₂ U ₁₁₈₃ U ₁₁₈₄ U ₁₁₈₅ U ₁₁₈₆ U ₁₁₈₇ U ₁₁₈₈ U ₁₁₈₉ U ₁₁₉₀ U ₁₁₉₁ U ₁₁₉₂ U ₁₁₉₃ U ₁₁₉₄ U ₁₁₉₅ U ₁₁₉₆ U ₁₁₉₇ U ₁	

Table 62

21454	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g aa ₂ CgagugagGg ₃ u agucua B	1510
21455	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g aa ₂ CgagugagGg ₃ u agucua B	1511
21456	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g c aag g CgagugagGg ₃ u agucua B	1512
21457	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g cc aag gg CgagugagGg ₃ u agucua B	1513
21458	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g cc guua gg CgagugagGg ₃ u agucua B	1514
21459	972	UGAGCU G CACUJC	27	9 ₅ 'c ₃ a ₃ g ₃ ug g cc guua gg C agugagGg ₃ u agucua B	1515
19664	1262	UUGGA g CCUGGC	34	9 ₅ 'c ₃ a ₃ g ₃ gg CgagagagGgagagag ₃ u uccuaa B	1516
20628	1262	UUGGA g CCUGGC	34	9 ₅ 'c ₃ a ₃ g ₃ gg CgagagagGgagagag ₃ u uccuaa B	1517

lower case = 2'-O-methyl
U, C = 2'-deoxy-2'-amino U, = 2'-deoxy-2'-amino C
G, A = ribo G, A
B = inverted deoxyabasic
P= polyethylene glycol 18 (PEG 18) linker

Table 63

Table 63: Human PKC α NCH Ribozyme and Substrate Sequence

Pos	Substrate	Seq ID	Ribozyme	Rz Seq ID
27	GGGGGGAC C AUGGCUGA		UCAGCCAU CUGAUGAG X CGAA IUCCCCCC	
28	GGGGGACC A UGGCUGAC		GUCAGCCA CUGAUGAG X CGAA IGUCCCCC	
33	ACCAUGGC U GACGUUUU		AAACGUC CUGAUGAG X CGAA ICCAUGGU	
43	ACGUUUUC C CGGGCAAC		GUUGCCCG CUGAUGAG X CGAA TAAACGCU	
44	CGUUUUCC C GGGCAACG		CGUUGCCC CUGAUGAG X CGAA IGAAAACG	
49	UCCCGGGC A ACGACUCC		GGAGUCGU CUGAUGAG X CGAA ICCCGGGA	
55	GCAACGAC U CCACGGCG		CGCCGUGG CUGAUGAG X CGAA IUCGUUCC	
57	AACGACUC C ACGCGGUC		GACGCCGU CUGAUGAG X CGAA IGCUCGUU	
58	ACGACUCC A CGGCGUCU		AGACGCCG CUGAUGAG X CGAA IGAGUCGU	
66	ACGGCGUC U CAGGACGU		ACGUCCUG CUGAUGAG X CGAA IACGCCGU	
68	GGCGUGGC A GGACGUGG		CCACGUCC CUGAUGAG X CGAA IAGACGCC	
78	GACGUGGC C AACCGCUU		AAGCGGUU CUGAUGAG X CGAA ICCACGUC	
79	ACGUUGGC A ACGCGUUC		GAAGCGGU CUGAUGAG X CGAA IGCCACGU	
82	UGGCCAAC C GCUUCGCC		GGCGAAGC CUGAUGAG X CGAA IUUGGCCA	
85	CCAACCGC U UCGCCCGC		GCGGGCGA CUGAUGAG X CGAA ICGGUUGG	
90	CGCUUGGC C CGCAAGG		CCUUGUCG CUGAUGAG X CGAA ICGUUGGC	
91	GCUUCGCC C GCAAGGG		CCCUUUGC CUGAUGAG X CGAA ICGCAAGC	
94	UCGCCGAC A AAGGGGCG		CGCCCUU CUGAUGAG X CGAA ICGCGCGA	
104	AGGGCGGC U GAGCGAGA		UCUGCCUC CUGAUGAG X CGAA ICGCCCUU	
110	CGUGAGGC A GAAGAACG		CGUUCUUC CUGAUGAG X CGAA ICCUCAGC	
122	GAACGUUC A CGAGGUGA		UCACCUUC CUGAUGAG X CGAA ICAAGUUC	
136	UGAAGGAC C ACAAUUC		GAAUUGU CUGAUGAG X CGAA IUCUUA	
137	GAAGGACC A CAAAUUCA		UGAAUUG CUGAUGAG X CGAA IUGCUUC	
139	AGGACCAC A AAUUAUC		GAUGAAU CUGAUGAG X CGAA IUGGCUUC	
145	ACAAAUUC A UCGCGCGC		GCUCGCGA CUGAUGAG X CGAA TAAUUGU	
154	UCGCGCGC U UCUUCAA		CUUGAAG CUGAUGAG X CGAA ICGCGCGA	
157	CGCGUUC U UCAAGCAG		CUGCUUGA CUGAUGAG X CGAA IAGCGCG	
160	GCUUCUUC A AGCAGCCC		GGGCUUCU CUGAUGAG X CGAA IAGGAGC	
164	CUUCAAAC A GCCCACCU		AGGUGGGC CUGAUGAG X CGAA ICUUGAAG	
167	CAAGCAGC C CACCUUCU		AGAAGGUG CUGAUGAG X CGAA ICGUCUUG	
168	AAGCAGCC C ACUCUUG		CAGAAGGU CUGAUGAG X CGAA ICGUCUUC	
169	AGCAGCCC A CCUCUUGC		GCAGAAGG CUGAUGAG X CGAA IGGCUGUC	
171	CAGCCAC C UUCUGCAG		CUGCAGAA CUGAUGAG X CGAA IUGGCGA	
172	AGCCACC C UUCGACG		CGUGCAGA CUGAUGAG X CGAA IUGGCGU	
175	CCACUUC U GCGACAC		GUGGCGUC CUGAUGAG X CGAA IAGGUGG	
178	CGUCUUGC A GCAUCUG		GCAGGCG CUGAUGAG X CGAA ICAGAAGG	
181	UCUGCAGC C ACUGACCC		GGUGCAGU CUGAUGAG X CGAA IUGCAGAG	
182	CGUCAGCC A CUGCACCG		CGGUGCAG CUGAUGAG X CGAA IGCUGCAG	
184	GCAGCCAC U GCACCGAC		GUCGUGUC CUGAUGAG X CGAA IUGGCUUC	
187	GCCACUAC A CCGACUUC		GAAGUCGG CUGAUGAG X CGAA ICAGUGGC	
189	CACUGCAC C GACUUAU		AUGAAGUC CUGAUGAG X CGAA IUGCAGUG	
193	GCACCGAC U UCAUCUGG		CCAGAUGA CUGAUGAG X CGAA IUGGUGUC	
196	CGACUUC A UCGGGGG		CCCCAGA CUGAUGAG X CGAA TAAUGCG	
199	ACUUAUC U GGGGUGU		AAACCCCC CUGAUGAG X CGAA TAUAGAU	
215	UGGGAAC A AGGCUUCC		GGAAGCCU CUGAUGAG X CGAA IUUUGCCA	
220	AACAGGC U UCCAGUC		GCACUGGA CUGAUGAG X CGAA ICCUUGUU	
223	AAGGCUUC C AGUGCCA		UUGGCACU CUGAUGAG X CGAA IAGCCUUC	

Table 63

224	AGGCUUCC	A	GUGCCAAG		CUUGGCAC	CUGAUGAG	X	CGAA	IGAAGCCU
229	UCCAGUGC	C	AAGUUUUC		GCAAAACU	CUGAUGAG	X	CGAA	ICACUGGA
230	CCAGUGCC	A	AGUUUGCU		AGCAAAACU	CUGAUGAG	X	CGAA	IGCACUGG
238	AAGUUUGC	U	GUUUUGUG		CACAAAAC	CUGAUGAG	X	CGAA	ICAAAACU
250	UUUGUGUC	C	ACAAGAGG		CCUCUUGU	CUGAUGAG	X	CGAA	IACACAAA
251	UGUGGUCC	A	CAAGAGGU		ACCUCUUG	CUGAUGAG	X	CGAA	IGACCACA
253	UGGUCCAC	A	AGAGGUGC		GCACCUCU	CUGAUGAG	X	CGAA	TUGGACCA
262	AGAGGUGC	C	AUGAAUJU		AAAUUCAU	CUGAUGAG	X	CGAA	ICACCUCU
263	GAGGUCC	A	UGAAUJUG		CAAAUUCA	CUGAUGAG	X	CGAA	IGAACUCC
276	UUUGUUAC	U	UUUUUUUG		CAAGAAAA	CUGAUGAG	X	CGAA	IUAACAAA
282	ACUUUUUC	U	UGUCCGGG		CCCGGACA	CUGAUGAG	X	CGAA	IATAAAGU
287	UUUUUGUC	C	GGGUGCGG		CCGCACCC	CUGAUGAG	X	CGAA	TACAAGAA
305	UAAGGAC	C	CGACACUG		CAGUGUCG	CUGAUGAG	X	CGAA	IUCCCUUA
306	AAAGGACC	C	GACACUGA		UCAGUGUC	CUGAUGAG	X	CGAA	IGUCCUUC
310	GACCCGAC	A	CUGAUGAC		GUCAUCAG	CUGAUGAG	X	CGAA	IUGGGUCU
312	CCCGGAC	U	GAUGACCC		GGGUCAUC	CUGAUGAG	X	CGAA	IUGUGGGG
319	CUGAUGAC	C	CCAGGAGC		GUCCUCUG	CUGAUGAG	X	CGAA	IUCAUCAG
320	UGAUGACC	C	CAGGAGCA		UGUCUCCU	CUGAUGAG	X	CGAA	IGUCAUCA
321	GAGGACCC	C	AGGAGCAA		IUGUCUCC	CUGAUGAG	X	CGAA	IGGUCUAC
322	AUGACCCC	A	GGAGCAAG		CUUGUCCU	CUGAUGAG	X	CGAA	IGGGUACU
328	CCAGGAC	A	AGCAAG		CUUGUCU	CUGAUGAG	X	CGAA	IUCUUGG
332	GAGCAAC	A	CAAGUUCA		UGAAUCUG	CUGAUGAG	X	CGAA	IUCUUGUC
334	GCAAGCAC	A	AGUUCAAA		UUUGAACU	CUGAUGAG	X	CGAA	IUGUCUCC
340	ACAAGUUC	A	AAAUCCAC		UGGGAUUU	CUGAUGAG	X	CGAA	IUAUUUGU
346	UCAAAUUC	C	ACACUUAU		GUAAUGU	CUGAUGAG	X	CGAA	IUAUUUGU
347	CAAAAUCC	A	CACUUAAG		CGUAAUGU	CUGAUGAG	X	CGAA	IUAUUUGU
349	AAAUCCAC	A	CUUACGGA		UCCGUUAG	CUGAUGAG	X	CGAA	IUGGAUUU
351	AUCCACAC	U	UACGGAAG		CUUCCGUA	CUGAUGAG	X	CGAA	IUGUGUAG
361	ACGGAAGC	C	CCACCUUC		GAAGGUGG	CUGAUGAG	X	CGAA	IUCUCCGU
362	CGGAAGCC	C	CACCUUCU		AGAAGGUG	CUGAUGAG	X	CGAA	IGCUUCCG
363	GGGAAGCC	C	ACCUUCUG		CAGAAGGU	CUGAUGAG	X	CGAA	IUGGUUCC
364	GAAGCCCC	A	CCUUCUGC		GCAGAAGG	CUGAUGAG	X	CGAA	IUGGUUCC
366	AGCCCCAC	C	UUUCUGGA		UCGCAGAA	CUGAUGAG	X	CGAA	IUGGGUCU
367	GCCCCACC	U	UCUGCGAU		AUCGCAGA	CUGAUGAG	X	CGAA	IUGGGGCG
370	CCACCUUC	U	GCGAUAC		GUGAUCGC	CUGAUGAG	X	CGAA	IAGGUGG
377	UCGCGAUC	A	CUGUGGGU		ACCCACAG	CUGAUGAG	X	CGAA	IUAUGCAG
379	GCGAUACU	U	GUGGGUCA		UGACCCAC	CUGAUGAG	X	CGAA	IUGAUCGC
387	UGUGGGUC	A	CUGUCUUA		UAGAGCAG	CUGAUGAG	X	CGAA	IACCCACA
389	UGGGUACU	U	GCUCUAG		CAUAGAGC	CUGAUGAG	X	CGAA	IUGACCCA
392	GUCAUCUG	U	CUAUGGAC		GUCCAUAU	CUGAUGAG	X	CGAA	IACUGUAC
394	CACUGCUC	U	AUGGACU		AAGUCCAU	CUGAUGAG	X	CGAA	IAGCAGUG
401	CUAUGGAC	U	UAUCCAU		GAUGGAUA	CUGAUGAG	X	CGAA	IUCCAUAG
406	GACUUAUC	C	AUCAAGG		CCCUUGAU	CUGAUGAG	X	CGAA	IUAUAGUC
407	ACUUAUCC	A	UCAAGGGA		UCCUUGA	CUGAUGAG	X	CGAA	IUAUAGU
410	UAUCCAU	A	AGGGGAUA		UCAUCCU	CUGAUGAG	X	CGAA	IUAUGAUA
427	AAUUGAC	A	CCUGCGAU		AUCGCAAG	CUGAUGAG	X	CGAA	IUAUUAU
429	UGUGACAC	C	UGCGAUU		AUAUCGCA	CUGAUGAG	X	CGAA	IUGUCACA
430	GUGACACC	U	GCGAUUAG		CAUAUCGC	CUGAUGAG	X	CGAA	IUGUUCAC
446	GAACGUUC	A	CAAGCAU		AUUGCUUG	CUGAUGAG	X	CGAA	IUAACGUU
448	ACGUUCAC	A	AGCAUUGC		GCAUUGCU	CUGAUGAG	X	CGAA	IUAAGCUU
452	UCACAAGC	A	AUGCGUCA		UGACGCAU	CUGAUGAG	X	CGAA	IUCUUGUA

Table 63

460	AAUGCGUC	A	UCAUGUC			GACAUUGA	CUGAUGAG	X	CGAA	IACGCAUU	
463	GCUCUAUC	A	AUGUCCCC			GGGGACAU	CUGAUGAG	X	CGAA	IAGACGUC	
469	UCAUGUC	C	CCAGCCUC			GAGGCGUG	CUGAUGAG	X	CGAA	IACAUAUG	
470	CAUAGUC	C	CAGCCUCU			AGAGGCUU	CUGAUGAG	X	CGAA	IGACAUG	
471	AAUGUCCC	C	AGCCUCUG			CAGAGGCU	CUGAUGAG	X	CGAA	IGGACAUA	
472	AUGUCCCC	A	GCCUCUGC			GCAGAGGC	CUGAUGAG	X	CGAA	IGGGACAU	
475	UCCCCAGC	C	UCUCGGGA			UCCGCGAG	CUGAUGAG	X	CGAA	ICUCGGGA	
476	CCCCAGCC	U	CUGCGGAA			UUCGCGAG	CUGAUGAG	X	CGAA	IGCUGGGG	
478	CACGCGUC	U	GCGGAUUG			CAUCCGCG	CUGAUGAG	X	CGAA	IAGGCUUG	
491	AAUGGAUC	A	CACUGAGA			UCUCAGUG	CUGAUGAG	X	CGAA	IAUCCAUA	
493	UGGAUCAC	A	CUGAGAAG			CUCUCAGC	CUGAUGAG	X	CGAA	IUGAUCCA	
495	GAUCACAC	U	GAGAAGAG			CUCUCUCU	CUGAUGAG	X	CGAA	IUGUGAUC	
517	GGAUUUAC	C	UAAAGGCU			AGCCUUUA	CUGAUGAG	X	CGAA	IUAUAUCC	
518	GAUUUAAC	U	AAAGGCGU			CAGCCUUU	CUGAUGAG	X	CGAA	IGUAAUUC	
525	CUAAAGGC	U	GAGGUUGC			GCAACCUU	CUGAUGAG	X	CGAA	ICCUUUGG	
534	GAGGUUGC	U	GAUGAATA			UUUUUAUC	CUGAUGAG	X	CGAA	ICAAACCU	
545	UGAAAAGC	U	CCAUGUCA			UGACAUGG	CUGAUGAG	X	CGAA	ICUUUUUA	
547	AAAAGCUC	C	AUGUCACA			UGUGACAU	CUGAUGAG	X	CGAA	IAGCUUUU	
548	AAAGCUCC	A	UGUCACAG			CUGUGACA	CUGAUGAG	X	CGAA	IAGGCUUU	
553	UCCAUGUC	A	CAGUACGA			UCGUAUCG	CUGAUGAG	X	CGAA	IACAUGGA	
555	CAUGUCAC	A	GUACGAGA			UCUCGUAC	CUGAUGAG	X	CGAA	IUGACAUG	
567	CGAGAUGC	A	AAAAAUUC			AGAUAUUU	CUGAUGAG	X	CGAA	ICAUCUCG	
575	AAAAAAUC	U	AAUCCCUA			UAGGGAUU	CUGAUGAG	X	CGAA	IATUUUUU	
580	AUAUAUUC	C	CUAUGGAU			AUCCAUAU	CUGAUGAG	X	CGAA	IUAUAUGA	
581	UCUAUUCC	C	UAUGGAUC			GAUCCAUA	CUGAUGAG	X	CGAA	IGAUAUGA	
582	CUAAUCCC	U	UAGGAUCC			GGAUCCAU	CUGAUGAG	X	CGAA	IGAUAUAG	
590	UAUGGAUC	C	AAACGGGC			GCCCGUUU	CUGAUGAG	X	CGAA	IAUCCAUA	
591	AUGGAUCC	A	AACGGGCU			AGCCCGUU	CUGAUGAG	X	CGAA	IGAUAUCC	
599	AAACGGGC	U	UUCAGAUU			GAUCUGAA	CUGAUGAG	X	CGAA	ICCCGUUU	
603	GGGCUUUC	A	GAUCCUUA			UAAGGAUC	CUGAUGAG	X	CGAA	IAAAGCCC	
608	UUCAGAUC	C	UUUAUGUA			UCACAUAU	CUGAUGAG	X	CGAA	IUAUCGAA	
609	UCAGAUCU	U	UAUGUGAA			UUCACAUA	CUGAUGAG	X	CGAA	IGAUCUGA	
620	UGUGAAGC	U	GAUAUCUA			UAAGUUUC	CUGAUGAG	X	CGAA	ICUUCACA	
626	GCUGAAGC	U	UAUUCUGU			CAGGAUAU	CUGAUGAG	X	CGAA	IUUUCAGC	
632	ACUUAUUC	C	UGAUCCCA			UGGGAUCA	CUGAUGAG	X	CGAA	IAUAUAUG	
633	CUUAUUCU	U	GAUCCCAA			UUGGGAUC	CUGAUGAG	X	CGAA	IGAUAUAG	
638	UCUCGAUC	C	CAAGAAUG			CAUUCUUG	CUGAUGAG	X	CGAA	IAUCAGGA	
639	CCUGAUCC	C	AAGAUAUG			UCAUUCUU	CUGAUGAG	X	CGAA	IGAUCAGG	
640	CUGAUCCC	A	AGAAUGAA			UAUUCUUC	CUGAUGAG	X	CGAA	IGAUCAGG	
652	UGAAAAGC	A	AGCAAAAA			UUUUUGCU	CUGAUGAG	X	CGAA	ICUUUUAU	
656	AAGCAAGC	A	AAAAACCA			UGUUUUUU	CUGAUGAG	X	CGAA	ICUUGCUU	
663	CAAAAAAC	C	AAAACCAU			AUGUUUUU	CUGAUGAG	X	CGAA	IUUUUUUG	
664	AAAAAACCC	A	AAACCAUC			GAUGUUUU	CUGAUGAG	X	CGAA	IGUUUUUU	
669	ACCAAAAC	C	AUCCGCUU			GAGCGGAG	CUGAUGAG	X	CGAA	IUUUUUGU	
670	CCAAAACC	A	UCCGCUCC			GGAGCGGA	CUGAUGAG	X	CGAA	IGUUUUUG	
673	AAACCAUC	C	GCUCCACA			UUUGGAGC	CUGAUGAG	X	CGAA	IUAUGUUU	
676	CCAUCCGC	U	CCACACUA			UAGUGUGG	CUGAUGAG	X	CGAA	ICGGGAUG	
678	AUCCGCUU	C	ACACUAAA			UUUAGUGU	CUGAUGAG	X	CGAA	IAGCGGAU	
679	UCCGCUCC	A	CACUAAAA			AUUUAUGU	CUGAUGAG	X	CGAA	IGAGCGGA	
681	CGCUCCAC	A	CUAAAUCC			GGAUUUAG	CUGAUGAG	X	CGAA	IUGGACGC	
683	CUCCACAC	U	AAAUCCGC			GCGGAUUU	CUGAUGAG	X	CGAA	IUGUGGAG	

Table 63

689	ACUAAAUC C	GCAGUGGA		UCCACUGC	CUGAUGAG	X	CGAA	IAUUAUUG	
692	AAAUCCGC	A GUGGAAUG		CAUCCAC	CUGAUGAG	X	CGAA	ICGGAUUU	
705	AAUGAGUC	C UUUACAUU		AAUGUAAA	CUGAUGAG	X	CGAA	IACUCAUU	
706	AUGAGUCC	U UUAACAUC		GAAGUGAA	CUGAUGAG	X	CGAA	IGACUCAU	
711	UCCUUUAC	A UUCAAAUU		AAUUUGAA	CUGAUGAG	X	CGAA	IUAAGGAA	
715	UUACAUCU	A AAUUGAAA		UUUCAUUU	CUGAUGAG	X	CGAA	IAAUGUAA	
725	AUUGAAAC	C UUCAGACA		UGUCUGAA	CUGAUGAG	X	CGAA	IUUUCAAU	
726	UUGAAACC	U UCAGACAA		UUUCUGA	CUGAUGAG	X	CGAA	IGUUUCAA	
729	UAACUUUC	A GACAAAGA		UUCUUUC	CUGAUGAG	X	CGAA	IAAGUUUU	
733	CUUCAGAC	A AAGACCGA		UCGUCUUU	CUGAUGAG	X	CGAA	IUCUGAAG	
739	ACAAAGAC	C GACGACUG		CAGUCGUC	CUGAUGAG	X	CGAA	IUCUUUGU	
746	CCGACGAC	U GUCUGUAG		CUACAGAC	CUGAUGAG	X	CGAA	IUCGUCGG	
750	CGACUGUC	U GUAGAAAU		AUUUCUAC	CUGAUGAG	X	CGAA	IACAGUCG	
760	UAGAAAUU	C GGGACUGG		CCAGUCCC	CUGAUGAG	X	CGAA	IAUUUCUA	
766	UCUGGGAC	U GGGAUCCA		UCGAUCCC	CUGAUGAG	X	CGAA	IUCCGAGA	
777	GAUCGAC	A ACAAGGAA		UUCCUUGU	CUGAUGAG	X	CGAA	IUUUGAUC	
780	CGAACAA	A AGGAAUGA		UCAUUCCU	CUGAUGAG	X	CGAA	IUUUUUCC	
790	GGAAUGAC	U UCAUGGGA		UCCCAUGA	CUGAUGAG	X	CGAA	IUCAUUCC	
793	AUAGAUUC	A UGGGAUCC		GGAUCCCA	CUGAUGAG	X	CGAA	IAAGUCAU	
801	AUGGGUUC	C UUUUCCUU		AAGGAAAG	CUGAUGAG	X	CGAA	IAUCCCAA	
802	UGGGAUCC	C UUUUCCUU		AAAGGAAA	CUGAUGAG	X	CGAA	IUAUCCCA	
803	GGGAUCCC	U UUUUUUUG		CAAAGGAA	CUGAUGAG	X	CGAA	IGGAUCCC	
807	UCCUUUUC	C UUUUGGAG		ACUCCAAA	CUGAUGAG	X	CGAA	IAAAGGGA	
808	CCUUUUUC	U UUGGAGUU		AACUCCAA	CUGAUGAG	X	CGAA	IGAAUAGG	
824	UUCCGAGC	U GAUGAAGA		UCUUUAUC	CUGAUGAG	X	CGAA	IUCCCGAA	
836	GAAGAUGC	C GGCACAGU		CACUGGCC	CUGAUGAG	X	CGAA	IUAUCUUC	
840	AUGCCGCG	C AGUGGAUG		CAUCCACU	CUGAUGAG	X	CGAA	I CCGCGAU	
841	UGCCCGCC	A GUGGAUGG		CCAUCCAC	CUGAUGAG	X	CGAA	IGCCGCGA	
853	GAUGGUAC	A AGUUGCUU		AAGCAACU	CUGAUGAG	X	CGAA	IUAACAUU	
860	CAAGUUGU	U UAACCAAG		CUUGGUUA	CUGAUGAG	X	CGAA	ICAAUUGU	
865	UUUUUAAC	C AAGAAGAA		UUUUUUUU	CUGAUGAG	X	CGAA	IUAUAGCA	
866	GUUUUAAC	A AGAAGAGG		UUUUUUUU	CUGAUGAG	X	CGAA	IGUUUAGC	
883	GUGAGUAC	U ACAACGUA		UAUGUUUU	CUGAUGAG	X	CGAA	IUAUCUAC	
886	AGUAUAC	A ACGUACCC		GGUAUCGU	CUGAUGAG	X	CGAA	IUAUUAUU	
893	CAACGUAC	C CAUUCGCG		CCGGAUUG	CUGAUGAG	X	CGAA	IUAUCGUU	
894	AACGUACC	C AUUCCGGA		UCCGGAUU	CUGAUGAG	X	CGAA	IUAUUAUU	
895	ACGUACCC	A UUCCGGAA		UUCCGGAA	CUGAUGAG	X	CGAA	IGGUUACU	
899	ACCCAUUC	C GGAAGGGG		CCCCUUCC	CUGAUGAG	X	CGAA	IAAUUGGU	
922	AAGGAUAC	A UGGAACUC		GAGUUCCA	CUGAUGAG	X	CGAA	IUUUUUUU	
929	CAUGGAAC	U CAGGACGA		UCUGCCUG	CUGAUGAG	X	CGAA	IUUUUAUU	
931	UGGAACUC	A GGCAGAAA		UUUUUCCC	CUGAUGAG	X	CGAA	IAGUUCCA	
935	ACUCAGGC	A GAAAUUCG		CGAAUUUC	CUGAUGAG	X	CGAA	I CCUGAGU	
951	GAGAAAGC	C AAACUUGG		CCAAUUUU	CUGAUGAG	X	CGAA	I CUUUUUC	
952	AGAAAGCC	A AAACUUGC		GCACAAUU	CUGAUGAG	X	CGAA	I GCUUUUUC	
956	AGCCAAAC	U UGGCCUUG		CAGGCCCC	CUGAUGAG	X	CGAA	IUUUUGGU	
961	AACUUUGC	C CUGCUUGC		CCCAAGUU	CUGAUGAG	X	CGAA	ICCAAGUU	
962	ACUUUGCC	C UGCUUGCA		UGCCAGCA	CUGAUGAG	X	CGAA	IGCCAAAG	
963	CUUGGCCU	U GCUUGCAA		UUCCAGCC	CUGAUGAG	X	CGAA	IGCCCAAG	
966	GGCCCUUC	U GGCACAAA		UUUUUCCC	CUGAUGAG	X	CGAA	I CAGGCC	
970	CUGCGGAC	A ACAAGGUC		GAUUUUUU	CUGAUGAG	X	CGAA	I CCAGCAG	
973	CUGGCAAC	A AAGUCAUC		GAUGACUU	CUGAUGAG	X	CGAA	I UUGCCAG	

Table 63

979	ACAAAGUC	A	UCAGUCCC		GGGACUGA	CUGAUGAG	X	CGAA	IACUUGU	
982	AAGUCAUC	A	GUCCCTUC		AGAGGGAC	CUGAUGAG	X	CGAA	TAUGACU	
986	CAUCAGUC	C	CUCUGAAG		CUCACAGG	CUGAUGAG	X	CGAA	IACUGAU	
987	AUCAGUCC	C	UCUGAAGA		UCUCACAG	CUGAUGAG	X	CGAA	IGACUGAU	
988	UCAGUCCC	U	CUGAAGAC		GUCUCUAC	CUGAUGAG	X	CGAA	IGGACUGA	
990	AGUCCUUC	U	GAAGACAG		CUGUCUUC	CUGAUGAG	X	CGAA	IAGGACU	
997	CUGAAGAC	A	GGAAACAA		UUGUUUCC	CUGAUGAG	X	CGAA	IUCUCAG	
1004	CAGGAAAC	A	ACCUUCCA		UGGAAGGU	CUGAUGAG	X	CGAA	IUUUCCG	
1007	GAACAAC	C	UUCCAACA		UGUUGGAA	CUGAUGAG	X	CGAA	IUUUUAU	
1008	AAACAACC	U	UCCAACAA		UUGUUGGA	CUGAUGAG	X	CGAA	IUGUUUU	
1011	CAACUUC	C	AACAACCU		AGGUUGUU	CUGAUGAG	X	CGAA	IAGGUUG	
1012	AACCUUCC	A	ACAACCUU		AAGGUUGU	CUGAUGAG	X	CGAA	IGAAGGU	
1015	CUUCCAAC	A	ACCUUGAC		GUCAAGGU	CUGAUGAG	X	CGAA	IUGUGAG	
1018	CCAACAAC	C	UUGACCGA		UCGGUCAA	CUGAUGAG	X	CGAA	IUGUUGG	
1019	CAACAACC	U	UGACCGAG		CUCGGUCA	CUGAUGAG	X	CGAA	IUGUUGG	
1024	ACCUUGAC	C	GAGUGAAA		UUUACUUC	CUGAUGAG	X	CGAA	IUCAUGA	
1034	AGUGAAAC	U	CACGGACU		AGUCCGUG	CUGAUGAG	X	CGAA	IUUUACU	
1036	UGAAACUC	A	CGGACUUC		GAGUCCG	CUGAUGAG	X	CGAA	IAGUUUA	
1042	UCACGGAC	U	UCAAUUUC		GAAAUUGA	CUGAUGAG	X	CGAA	IUCCUGA	
1045	CGGACUUC	A	AUUUCCUC		GAGGAAAU	CUGAUGAG	X	CGAA	IAGUUCG	
1051	UCAAUUUC	C	UCAUGGUG		CACCAUGA	CUGAUGAG	X	CGAA	IAAAUUGA	
1052	CAAUUUC	U	CAUGGUUG		ACACCAUG	CUGAUGAG	X	CGAA	IGAUAUUG	
1054	AUUUCCUC	A	UGGUUGUG		CAACACCA	CUGAUGAG	X	CGAA	IAGGAAAU	
1091	GGUGAUGC	U	UGCCGACA		UGUCGGCA	CUGAUGAG	X	CGAA	IUAUCACC	
1095	AUGCUUGC	C	GACAGGAA		UUCUUGUC	CUGAUGAG	X	CGAA	IACAGAU	
1099	UUUGCCGAC	A	GGAGGGC		GUCCUCC	CUGAUGAG	X	CGAA	IUGCGCA	
1108	GGAGGGC	A	CAGAGGAA		UUUUCUUG	CUGAUGAG	X	CGAA	ICCUUCU	
1110	AAGGGCAC	A	GAAGAACT		AGUUUUUC	CUGAUGAG	X	CGAA	IUGCCUU	
1118	AGAAGAAC	U	GUUGGCAA		UUGCAUAC	CUGAUGAG	X	CGAA	IUUUUUC	
1125	CUGAUUGC	A	AUCAAUAU		AUUUUUGA	CUGAUGAG	X	CGAA	IUAUACG	
1129	AUGCAAUC	A	AAAUCCUG		CAGGAUUU	CUGAUGAG	X	CGAA	IUUUUGA	
1135	UCNAAUUC	C	UGAAGAAG		CUUCUUA	CUGAUGAG	X	CGAA	IUUUUUA	
1136	CAAAAUCC	U	GAAGAAGG		CCUUCUUC	CUGAUGAG	X	CGAA	IUAUUUG	
1157	GGUGAUUC	A	GGUUGAUG		CAUCAUCC	CUGAUGAG	X	CGAA	IUAUCACC	
1177	UGGAGUGC	A	CCAUGGUA		UACCAUGG	CUGAUGAG	X	CGAA	IACUCCA	
1179	GAGUGGAC	C	AUGUGAGA		UUCACCAU	CUGAUGAG	X	CGAA	IUGCACU	
1180	AGUGCACC	A	UGGUGAGA		UUCUACCA	CUGAUGAG	X	CGAA	IUGGACU	
1198	AGCAGUUC	U	UGGCCUUG		CAGGGCCA	CUGAUGAG	X	CGAA	IACUCCU	
1203	GUCUUGGC	C	CUGCUUGA		UCAAGCAG	CUGAUGAG	X	CGAA	IUAUAGC	
1204	UCUUGGCC	C	UGCUUGAC		GUCAAGCA	CUGAUGAG	X	CGAA	IUGGACGA	
1205	CUUGGCCU	U	GUUGGACA		UGUCAAGC	CUGAUGAG	X	CGAA	IUGGACG	
1208	GGCCUUGC	U	UGACAAAC		GUUUGUCA	CUGAUGAG	X	CGAA	IUGGACG	
1213	UGCUUGAC	A	AACCCCGC		CGGGGGUU	CUGAUGAG	X	CGAA	IUAAGCA	
1217	UGACAAAC	C	CCGUUUUC		AGAACGGG	CUGAUGAG	X	CGAA	IUUUGUA	
1218	GACAAACC	C	CCGUUUUC		AAGAACGG	CUGAUGAG	X	CGAA	IUUUGUC	
1219	ACAAACCC	C	CGUUUUUG		CANAAACG	CUGAUGAG	X	CGAA	IUUUGUU	
1220	CAAAACCC	C	GUUCUUGA		UCAAGAAC	CUGAUGAG	X	CGAA	IUGGUUG	
1225	CCCCGUUC	U	UGACCGAC		UGCGUACA	CUGAUGAG	X	CGAA	IACCGGG	
1232	CUUGACGC	A	GUUGACU		AGUGCAGC	CUGAUGAG	X	CGAA	IUGGACG	
1235	GACCGAGC	U	GCAUCCU		AGGAGUGC	CUGAUGAG	X	CGAA	IUGGUCU	
1238	GCAUGUC	A	CUCCUUCU		AGCAGGAG	CUGAUGAG	X	CGAA	IACGUGC	

Table 63

1240	AGCUGCAC	U	CCUGCUUC		GAAGCAGG	CUGAUGAG	X	CGAA	IUGCAGCU	
1242	CUGCACUC	C	UGCUUCCA		UGGAAGCA	CUGAUGAG	X	CGAA	IAGUGCAG	
1243	UGCACUCC	U	GUUCCAG		CUGGAAGC	CUGAUGAG	X	CGAA	IAGUGCA	
1246	ACUCCUGC	U	UCCAGACA		UGUCUGGA	CUGAUGAG	X	CGAA	IACAGGAGU	
1249	CCUGCUUC	C	AGACAGUG		CACUGUCU	CUGAUGAG	X	CGAA	IAGCAGG	
1250	CUGCUUCC	A	GACAGUGG		CCACUGUC	CUGAUGAG	X	CGAA	IAGACGAG	
1254	UUCACGAC	A	GUGGAUCG		CGAUCCAC	CUGAUGAG	X	CGAA	IUCUGGAA	
1265	GGAUCGCG	U	GUACUUCG		CGAAGUAC	CUGAUGAG	X	CGAA	ICCGAUCC	
1270	GGCUGUAC	U	UCGUCAUG		CAUGACGA	CUGAUGAG	X	CGAA	IUACAGCC	
1276	ACUUCGUC	A	UGGAUAU		AUAUCCA	CUGAUGAG	X	CGAA	IACGAAGU	
1288	AAUAUGUC	A	ACGGUGGG		CCCACCGU	CUGAUGAG	X	CGAA	IACAUU	
1300	GUGGGGAC	C	UCAUGUAC		GUACAUCA	CUGAUGAG	X	CGAA	IUCCCCAC	
1301	UGGGGACC	U	CAUGUACC		GGUACAUG	CUGAUGAG	X	CGAA	IUGCCCCA	
1303	GGGACCUC	A	UGUACCAC		GUGGUACA	CUGAUGAG	X	CGAA	IAGGUCCC	
1309	UCAUGUAC	C	ACAUUCAG		CUGAAUGU	CUGAUGAG	X	CGAA	IUACAUCA	
1310	CAUGUACC	A	CAUUCAGC		GCUGAUG	CUGAUGAG	X	CGAA	IUGACAU	
1312	UGUACCAC	A	UUCAGCAA		UUGCUGAA	CUGAUGAG	X	CGAA	IUGGUACA	
1316	CCACAUCU	A	GCAAGUAG		CUACUUGC	CUGAUGAG	X	CGAA	IAGUGUGG	
1319	CAUUCAGC	A	AGUAAGAA		UUCUACU	CUGAUGAG	X	CGAA	IUGUACUG	
1340	UAGGAAC	C	ACAAGCAG		CUGCUUGU	CUGAUGAG	X	CGAA	IUCUCUUA	
1341	AAGGAACC	A	CAAGCAGU		ACUGCUUG	CUGAUGAG	X	CGAA	IUGUCCUU	
1343	GGAAACCAC	A	AGCAGUAU		AUACUGCU	CUGAUGAG	X	CGAA	IUGGUUCC	
1347	CCACAAGC	A	GUUAUCUA		UAGAAUAC	CUGAUGAG	X	CGAA	IUCUGUGG	
1354	CAGUAUUC	U	AUGCGGCA		UGCCGCAU	CUGAUGAG	X	CGAA	IAGUCCAA	
1362	UAUGCGGC	A	GAGAUUUC		GAAAUUCU	CUGAUGAG	X	CGAA	ICCGAUAA	
1371	GAGAUUUC	C	AUCGGAUU		AAUCCGAU	CUGAUGAG	X	CGAA	IAGAUUCU	
1372	AGAUUUC	A	UCGGAUUG		CAAUCCGA	CUGAUGAG	X	CGAA	IGAAAUUCU	
1384	GAUUGUUC	U	UUUCUACU		AUGAAGAA	CUGAUGAG	X	CGAA	IACCAUUC	
1388	GUUUCUUC	U	UCAUAAAA		UUUUAUGA	CUGAUGAG	X	CGAA	IAGAGAAC	
1391	CUUUCUUC	A	UAAAAGAG		CUUUCUUA	CUGAUGAG	X	CGAA	IAGAGAAC	
1405	GAGGAUUC	A	UUUAUAGG		CUUAUAAA	CUGAUGAG	X	CGAA	IAGUCCUC	
1418	UAGGGAUC	U	GAGGUUAG		CUAAAUUC	CUGAUGAG	X	CGAA	IAGUCCUA	
1435	AUAACGUC	A	UGUUGGAU		AUCCAACA	CUGAUGAG	X	CGAA	IACGUUAU	
1446	UUGGAUUC	A	GAAAGACA		UGUCCUUC	CUGAUGAG	X	CGAA	IAGUCCAA	
1454	AGAAAGAC	A	UAUCAAUA		UUUUGAUA	CUGAUGAG	X	CGAA	IUCUUCUUC	
1459	GACAUUUC	A	AAAUUUCU		AGCAAUUU	CUGAUGAG	X	CGAA	IAGUUCU	
1467	AAAATUUC	U	GACUUUGG		CCAAAGUC	CUGAUGAG	X	CGAA	ICAAUUUU	
1471	UUGCUGAC	U	UUGGGUAG		CAUCCCAA	CUGAUGAG	X	CGAA	IUCAGCAA	
1483	GGAUGUUC	A	AGGAACAC		GUGUCCU	CUGAUGAG	X	CGAA	IUCAGUCC	
1490	CAAGGAAC	A	CAUGAUUG		CCAUAUG	CUGAUGAG	X	CGAA	IUCUUCU	
1492	AGGAACAC	A	UGAUGGAU		AUCCAUA	CUGAUGAG	X	CGAA	IUGUUCU	
1507	AUGGAGUC	A	CGACCAGG		CCUGGUCG	CUGAUGAG	X	CGAA	IACUCCAU	
1512	GUACGAC	C	AGGACCUU		AAGGUCCU	CUGAUGAG	X	CGAA	IUCGUGAC	
1513	UCACGACC	A	GAAACUUC		GAAGGUCC	CUGAUGAG	X	CGAA	IUGUGGUA	
1518	ACGAGGAC	C	UUUCUGUG		CCACAGAA	CUGAUGAG	X	CGAA	IUCUGGUU	
1519	CCAGGACC	U	UCUGUGGG		CCACAGAA	CUGAUGAG	X	CGAA	IUGUCCUG	
1522	GGACCUUC	U	GUGGGACU		AGUCCCA	CUGAUGAG	X	CGAA	IAGGUUCC	
1530	UGGGGAC	U	CCAGAUUA		UAUUCUGG	CUGAUGAG	X	CGAA	IUCGCCAA	
1532	UGGAGCUC	C	AGAUUAUA		UAUAUUCU	CUGAUGAG	X	CGAA	IAGUCCCA	
1533	GGGACUCC	A	GAUUAUAU		AUAUAUUC	CUGAUGAG	X	CGAA	IAGUCCU	
1545	UAUAUCCG	C	CCAGAGAU		AUCUCUGG	CUGAUGAG	X	CGAA	IUGAUUA	

Table 63

1546	AUAUCGCC	C	CAGAGUAU		UAUCUCUG	CUGAUGAG	X	CGAA	IGCGAUU	
1547	UAUCGCCCC	C	AGAGAUAA		UAUUCUCU	CUGAUGAG	X	CGAA	IGGCGAU	
1548	AUCGCCCC	A	GAGAUAAU		AUAUUCUC	CUGAUGAG	X	CGAA	IGGGCGAU	
1560	AUAUUCGC	U	UAUCAGCC		GGCUGAUU	CUGAUGAG	X	CGAA	ICGAUUU	
1565	CGCUUAUC	A	GCCGUAUG		CAUACGGC	CUGAUGAG	X	CGAA	IAUAAGCG	
1568	UAUACAGC	C	GUAUGGAA		UUCCAUAC	CUGAUGAG	X	CGAA	ICGUAUUA	
1581	GGAAAAUC	U	GUUGACTG		CAGUCCAC	CUGAUGAG	X	CGAA	IAUUAUCC	
1588	CUGUGGAC	U	GGUGGGCC		GGCCACC	CUGAUGAG	X	CGAA	IUCCACAG	
1596	UGUGGACC	C	UAUGGCGU		ACGCCAUU	CUGAUGAG	X	CGAA	ICCCACAG	
1597	GGUGGGCC	U	AUGGCGUC		GACGCCAU	CUGAUGAG	X	CGAA	IGGCCACC	
1606	UAUGGCGC	C	GUUGUAU		AUAACAAC	CUGAUGAG	X	CGAA	IACGCCAU	
1607	UGGCGUCC	U	GUUGUAUG		CAUACAAC	CUGAUGAG	X	CGAA	IGACGCCA	
1622	UGAAUUC	U	UGCGGGCC		GCCCGGCA	CUGAUGAG	X	CGAA	ICAUUUA	
1626	AUGCUUGC	C	GGCGAGCC		GGCUGCCC	CUGAUGAG	X	CGAA	ICAGGCAU	
1631	UGCCGGGC	A	GCCUCCAU		AUGGAGGC	CUGAUGAG	X	CGAA	ICCCGGCA	
1634	CGGGGCGC	C	UCCAUUUG		CAAAUGGA	CUGAUGAG	X	CGAA	ICUGGCCG	
1635	GGGCGGCC	U	CCAUAUGA		UCAAUUGG	CUGAUGAG	X	CGAA	IGCUGCCC	
1637	GCAGCCUC	C	AUUUGAUG		CAUCAAAU	CUGAUGAG	X	CGAA	IAGGCGUC	
1638	CAGCCUCC	A	UUUGAUGG		CCAUCAAA	CUGAUGAG	X	CGAA	ICAGGCAU	
1664	AGACGAGC	U	AUUUCAGU		ACUGAAAU	CUGAUGAG	X	CGAA	ICUGGCUU	
1670	CGUAUUAU	A	GUCUAUCA		UGAUAAGC	CUGAUGAG	X	CGAA	IAAAUAGC	
1674	UUUCAGUC	U	AUCAUGGA		UCCAUGAU	CUGAUGAG	X	CGAA	IACUGAAA	
1678	AGUCUAUC	A	UGGAGCAC		GUGCUCCA	CUGAUGAG	X	CGAA	IAUAGACU	
1685	CAUGGAGC	A	CAACGUUU		AAACGUUG	CUGAUGAG	X	CGAA	ICUCCAU	
1687	UGGAGCAC	A	ACGUUUCC		GGAAACGU	CUGAUGAG	X	CGAA	IUGCCCA	
1695	AACGUUUC	C	UAUCCAAA		UUUGGAUA	CUGAUGAG	X	CGAA	IAAACGUA	
1696	ACGUUUCU	U	AUCCAAAA		UUUUGGAU	CUGAUGAG	X	CGAA	IGAAACGU	
1700	UUCCUAUC	C	AAAUCCU		AGGAUUUU	CUGAUGAG	X	CGAA	IAUAGGAA	
1701	UCCUAUCC	A	AAAUCCUU		AAGGAUUU	CUGAUGAG	X	CGAA	IGAUAGGA	
1707	CCAAAUUC	C	UUGUCCAA		UUGGACAA	CUGAUGAG	X	CGAA	IAUUAUUG	
1708	CAAAAUUC	U	UGUCCAA		CUUGGACA	CUGAUGAG	X	CGAA	IGAUUUUG	
1713	UCCUUGUC	C	AAGGAGGC		GCCUCCUU	CUGAUGAG	X	CGAA	IACAAGGA	
1714	CCUUGUCC	A	AGGAGGCU		AGCCUCCU	CUGAUGAG	X	CGAA	IGACAAGG	
1722	AAGGAGGC	U	GUUUUUAU		AUAGAAAC	CUGAUGAG	X	CGAA	ICCUCCUU	
1728	CGUGUUUC	U	AUCUGCAA		UUGCAGAU	CUGAUGAG	X	CGAA	IAAACAGC	
1732	UUUUAUUC	U	GCAAAAGGA		UCCUUGC	CUGAUGAG	X	CGAA	IAUAGAAA	
1735	CUAUCUGC	A	AAGGACUG		CAGUCCUU	CUGAUGAG	X	CGAA	ICAGAUAG	
1742	CAAGGAGC	U	GAUGACCA		UGGUCAUC	CUGAUGAG	X	CGAA	IUCUUUUG	
1749	CUAUGAGC	C	AAACACCC		GGGUGUUU	CUGAUGAG	X	CGAA	IUAUACAG	
1750	UGAUGACC	A	AACACCCA		UGGGUGUU	CUGAUGAG	X	CGAA	IUGUAUCA	
1754	GACCAAAC	A	CCGACCCA		UGGCGGGG	CUGAUGAG	X	CGAA	IUUUGGUC	
1756	CCAAACAC	C	CAGCCAAG		CUUGGCGU	CUGAUGAG	X	CGAA	IUGUUUGG	
1757	CAAAACCC	C	AGCCAAAG		GUUGGCGU	CUGAUGAG	X	CGAA	IUGUUUGG	
1758	AAACACCC	A	GCCAAGCG		CGCUUGGC	CUGAUGAG	X	CGAA	IGGUGUUU	
1761	CACCCAGC	C	AAGCGGCU		AGCCGCUU	CUGAUGAG	X	CGAA	ICUGGGUG	
1762	ACCCAGCC	A	AGCGGCGU		CACCGCUU	CUGAUGAG	X	CGAA	IGCUUGGU	
1769	CAAGCGGC	U	GGGCGUGU		CAGAGCCC	CUGAUGAG	X	CGAA	ICCGCUUG	
1774	GGCUGGGC	U	GUUGGCGU		AGGCCAAC	CUGAUGAG	X	CGAA	ICCCAGCC	
1781	CUUGUGGC	C	UGAGGGGG		CGCCCUCA	CUGAUGAG	X	CGAA	ICCCACAG	
1782	UGUGGGCC	U	GAGGGGGA		UCCCCUUC	CUGAUGAG	X	CGAA	IGCCCAAC	
1808	GAGGAGGC	A	UGCCUUUC		AGAAAGCA	CUGAUGAG	X	CGAA	ICUUCUUC	

Table 63

1812	GAGCAUGC	C	UUCUCCG		CGGAAGAA	CUGAUGAG	X	CGAA	ICAUGUC	
1813	AGCAUGCC	U	UUCUCCG		CCGAAGA	CUGAUGAG	X	CGAA	ICGAUGCU	
1816	AUGCCUUC	U	UCCGAGG		CCUCCGA	CUGAUGAG	X	CGAA	IAAGGCAU	
1819	CCUUCUUC	C	GGAGGAUC		GAUCCUC	CUGAUGAG	X	CGAA	IAAGAAGG	
1831	GGAUCCAC	U	GGGAAAA		UUUUCCC	CUGAUGAG	X	CGAA	IUCGAUCC	
1841	GGAAAAAC	U	GGAGAAC		UGUUCUC	CUGAUGAG	X	CGAA	IUUUUCC	
1849	UGGAGAAC	A	GGGAGAUC		GAUUCUCC	CUGAUGAG	X	CGAA	IUUUCUCC	
1858	GGGAGAUC	C	AGCCACCA		UGGUGGU	CUGAUGAG	X	CGAA	IAUUCUCC	
1859	GAAGAUCC	A	GCCACCAU		AUGGUGC	CUGAUGAG	X	CGAA	IGAUCUCC	
1862	GAUCCAGC	C	ACCAUCCA		UGAAUGG	CUGAUGAG	X	CGAA	ICUGAUC	
1863	AUCCAGCC	A	CCAUCUA		UGAAUGG	CUGAUGAG	X	CGAA	IUGUGAU	
1865	CCAGCCAC	C	AUCCAAGC		GCUGAAU	CUGAUGAG	X	CGAA	IUGGUGG	
1866	CAGCCACC	A	UCCAAGCC		GCUGGAA	CUGAUGAG	X	CGAA	IUGGUGG	
1870	CACCAUUC	A	AGCCCAAA		UUUGGCU	CUGAUGAG	X	CGAA	IAAUGGUG	
1874	AUCCAAGC	C	CAAAUGGU		ACACUUG	CUGAUGAG	X	CGAA	ICUUGAU	
1875	UCCAAGCC	C	AAAGUGUG		CACAUUU	CUGAUGAG	X	CGAA	IUGGUGA	
1876	UCAAGCCC	A	AAAGUGUG		ACACAUU	CUGAUGAG	X	CGAA	IUGGUGA	
1888	UGUGUGGC	A	AAGGAGCA		UGCUCUU	CUGAUGAG	X	CGAA	ICACACAC	
1896	AAAGGAGC	A	GAGAAUUC		AAAUUCU	CUGAUGAG	X	CGAA	ICUUCUUC	
1903	CAGGAGAC	U	UUGACAA		CUUGUCA	CUGAUGAG	X	CGAA	IUCUUCUG	
1909	ACUUGAGC	A	AGUUCUUC		GAAGAAC	CUGAUGAG	X	CGAA	IUCAAAU	
1915	ACAAGUUC	U	UCACACGA		UCUGUGA	CUGAUGAG	X	CGAA	IAACUUGU	
1918	AGUUCUUC	A	CACGAGGA		UCCUGUG	CUGAUGAG	X	CGAA	IAAGAAUC	
1920	UUUUCUAC	A	CGAGGACA		UGUCCUG	CUGAUGAG	X	CGAA	IUGAAGAA	
1928	ACGAGGAC	A	GCCGCUUC		AGACGGC	CUGAUGAG	X	CGAA	IUCUUCUG	
1931	AGGACGCC	C	CGUUAUAA		UUAAGAG	CUGAUGAG	X	CGAA	IUGGUGU	
1932	GGACAGCC	C	GUUUAUAA		GUUAGAG	CUGAUGAG	X	CGAA	IUGGUGU	
1936	AGCCCGUC	U	UAACACCA		UGGUGUA	CUGAUGAG	X	CGAA	IACGGGCU	
1941	GUUUAUAC	A	CCACCUGA		UCAGGUG	CUGAUGAG	X	CGAA	IUUUAAGC	
1943	CUUUAUAC	C	ACCUGAUC		GAUCAGG	CUGAUGAG	X	CGAA	IUGUUAAG	
1944	UUAAACAC	A	CCUGAUCA		UGAUCAG	CUGAUGAG	X	CGAA	IUGUUAU	
1946	AACACCAC	C	UGAUCAGC		GCUGAUC	CUGAUGAG	X	CGAA	IUGGUGU	
1947	ACACCACC	U	GAUCAGCU		AGCUGAU	CUGAUGAG	X	CGAA	IUGGUGU	
1952	ACUGAUUC	A	GCUGGUUA		UAACGAG	CUGAUGAG	X	CGAA	IAUCAGGU	
1955	UGAUCAGC	U	GGUUAUUG		CAUAUAC	CUGAUGAG	X	CGAA	ICUGAUAC	
1965	GUUAUUC	U	AAUAUAGA		UCUAUUG	CUGAUGAG	X	CGAA	ICAAUUA	
1969	UUGCUAAC	A	UAGACCAG		CUGGUCU	CUGAUGAG	X	CGAA	IUUAGCAA	
1975	ACAUAGAC	C	AGUCUGAU		AUCAGAC	CUGAUGAG	X	CGAA	IUCUAUUG	
1976	CUAAGACC	A	GUUCGAU		AAUCAGC	CUGAUGAG	X	CGAA	IUCUAUUG	
1980	GACCAGUC	U	GAUUAUUA		UCAAUUC	CUGAUGAG	X	CGAA	IACUGGUC	
1996	AAGGGUUC	U	CGUAUGUC		GACAUUC	CUGAUGAG	X	CGAA	IAACCUUC	
2005	CGUAUGUC	A	ACCCCCAG		CUGGGGU	CUGAUGAG	X	CGAA	IACAUAUC	
2008	AUGUCAAC	C	CCGAGUUU		AAUCUGG	CUGAUGAG	X	CGAA	IUGGAGAU	
2009	UGUCAACC	C	CCAGUUUG		CAACUGG	CUGAUGAG	X	CGAA	IUGGAGAU	
2010	GUCAACCC	C	CAGUUUGU		ACAACUG	CUGAUGAG	X	CGAA	IUGGAGAU	
2011	UCAACCCC	C	AGUUUGUG		CACAAAU	CUGAUGAG	X	CGAA	IUGGAGAU	
2012	CAACCCCC	A	GUUUGUGC		GCACAAAC	CUGAUGAG	X	CGAA	IUGGAGUG	
2021	GUUUGUGC	A	CCCCAUUC		AGAUGGG	CUGAUGAG	X	CGAA	ICACAAAC	
2023	UUGUGUAC	C	CCAUCUUA		UAAGAUGG	CUGAUGAG	X	CGAA	IUGGACAA	
2024	UGUGCACC	C	CAUCUUAU		GUAGAUG	CUGAUGAG	X	CGAA	IUGGACAA	
2025	GUGCACC	C	AUCUUAUA		UGUAAGU	CUGAUGAG	X	CGAA	IUGGACAC	

Table 63

2026	UGCACCCC	A	UCUACAG			CUGUAGA	CUGAUGAG	X	CGAA	IGGGUGCA	
2029	ACCCCAUC	U	UACAGAGU			ACUCUGUA	CUGAUGAG	X	CGAA	TAUGGGGU	
2033	CAUCUAC	A	GAGUGCAG			CUGCACUC	CUGAUGAG	X	CGAA	TAAAGAUG	
2040	CAGAGUGC	A	GUAGUAAA			UUUCAUAC	CUGAUGAG	X	CGAA	ICACUCUG	
2050	UAUGAAAC	U	CACCAGCG			CGCUGGUG	CUGAUGAG	X	CGAA	TUUUCAAU	
2052	UGNAACUC	A	CCAGCGAG			CUCGCGGG	CUGAUGAG	X	CGAA	TAGUUUCA	
2054	AAACUCAC	C	AGCGAGAA			UUUCGCGU	CUGAUGAG	X	CGAA	TUGAGUUU	
2055	AAUCUACC	A	GCGAGAAC			GUUCUCGC	CUGAUGAG	X	CGAA	IGUGAGUU	
2064	CGAGGAAC	A	AACACUCC			GAGGUGUU	CUGAUGAG	X	CGAA	TUUCUCGC	
2068	GAACAAAC	A	CCUCCCCA			UGGGGAGG	CUGAUGAG	X	CGAA	TUUUUGUC	
2070	ACNAACAC	C	UCCCCAGC			GCUGGGGA	CUGAUGAG	X	CGAA	IGGUUUUG	
2071	CAAAACAC	U	CCCCAGCC			GGCUGGGG	CUGAUGAG	X	CGAA	TGUUUUUG	
2073	AAACUCUC	C	CCAGCCCC			GCGGCGUG	CUGAUGAG	X	CGAA	TAGGUUUU	
2074	ACACCUCC	C	CAGCCCCC			GCGGCGUG	CUGAUGAG	X	CGAA	IGAGUGUG	
2075	CACCUCCC	C	AGCCCCCA			UGGGGGCU	CUGAUGAG	X	CGAA	IGGAGGUG	
2076	ACUUCUCC	A	GCCCCCAG			CGGGGGGC	CUGAUGAG	X	CGAA	IGGGAGGU	
2079	UCCCCAGC	C	CCCAGCCC			GGGCGUGG	CUGAUGAG	X	CGAA	ICUGGGGA	
2080	CCCCAGCC	C	CCAGCCCU			AGGGCUGG	CUGAUGAG	X	CGAA	TGUCUGGG	
2081	CCCAAGCC	C	CAGCCUCC			GAGGCGUG	CUGAUGAG	X	CGAA	IGGUCUGG	
2082	CCAGCCCC	C	AGCCCCUC			GAGGGGCU	CUGAUGAG	X	CGAA	IGGGCUGG	
2083	CGCCCCCC	A	GCCCCUCC			GGGAGGGC	CUGAUGAG	X	CGAA	IGGGCGUG	
2086	CCCCCAGC	C	CUCCCCGC			GCGGGGAG	CUGAUGAG	X	CGAA	ICUGGGGG	
2087	CCCCCAGC	C	UCCCCGCA			UGCGGGGA	CUGAUGAG	X	CGAA	IGCUGGGG	
2088	CCCAAGCC	U	CCCCGAG			CUGCGGGG	CUGAUGAG	X	CGAA	IGGUCUGG	
2090	CACCUCCC	C	CCGACAGU			CACUGCGG	CUGAUGAG	X	CGAA	TAGGGGUG	
2091	AGCCUCCC	C	CGACUGUG			CCACUGCG	CUGAUGAG	X	CGAA	TAGGGGCU	
2092	GCCUCCCC	C	GCAGUGGA			UCCACUGC	CUGAUGAG	X	CGAA	IGGAGGGC	
2095	CUCCCCGC	A	GUGGAAGU			ACUCCAC	CUGAUGAG	X	CGAA	TCGGGGAG	
2109	AGUGAAUC	C	UUAACCCU			AGGGUUA	CUGAUGAG	X	CGAA	TAUUCAU	
2110	GUGAAUCC	U	UAAACCUA			UAGGGUUA	CUGAUGAG	X	CGAA	IGAUCAC	
2115	UCCUUAAC	C	CUAAAAUU			AAUUUUAG	CUGAUGAG	X	CGAA	TUUUAGGA	
2116	CCUUAACC	C	UAAAAUUU			AAAUUUUA	CUGAUGAG	X	CGAA	IGUUAAAG	
2117	CUUAACCC	U	AAAAUUUU			AAAAUUUU	CUGAUGAG	X	CGAA	IGGUUAAG	
2131	UUUAAGGC	C	ACGGCUUG			CAAGCCGU	CUGAUGAG	X	CGAA	TCUUUAAA	
2132	UUUAAGGC	A	CGGCUUGU			ACAAGCCG	CUGAUGAG	X	CGAA	IGCCUUAA	
2137	GCCACGGC	U	UGUGUCUG			CAGACACA	CUGAUGAG	X	CGAA	TCGUGGCG	
2144	CUUGUGUC	U	GAUUCUUA			AUGGAUUC	CUGAUGAG	X	CGAA	IACACAAG	
2150	UCUGAUUC	C	AUAGGAG			CUCCAUU	CUGAUGAG	X	CGAA	TAAUCAGA	
2151	CGUAUUCU	A	UAUGGAGG			CCUCCAUA	CUGAUGAG	X	CGAA	IGAAUCAG	
2161	AUGGAGGC	C	UGAAAAUU			AAUUUUUA	CUGAUGAG	X	CGAA	TCUUUCAA	
2162	UGGAGGCC	U	GAAAAUUG			CAUUUUUC	CUGAUGAG	X	CGAA	IGCCUCCA	
2185	UAUUAGUC	C	AAAUUGUA			UCACUUUU	CUGAUGAG	X	CGAA	IACUAAUA	
2186	AUUAGUCC	A	AAUGUGUA			AUCACAUU	CUGAUGAG	X	CGAA	IGACUAAU	
2196	UGUAUUC	A	ACUUAUCA			UGAACAGU	CUGAUGAG	X	CGAA	TAUCAUUA	
2199	UGAUACAC	U	GUUCAGGG			CCUGAAC	CUGAUGAG	X	CGAA	TUUGAUCA	
2204	AAUCUGUC	A	GUGUCUCU			AGAGACCC	CUGAUGAG	X	CGAA	TAAACGUU	
2210	UCAGGGUC	U	CUCUCUUA			UAAAGAGG	CUGAUGAG	X	CGAA	TACCCUGA	
2212	AGGUCUCU	U	CUCUUAAC			UGUAAAGG	CUGAUGAG	X	CGAA	TAGACCCU	
2214	GGUCUCUC	U	CUUACAAC			GUUGUAA	CUGAUGAG	X	CGAA	TAGAGACC	
2216	UCUCUCUC	U	UACAACCA			UGGUUGUA	CUGAUGAG	X	CGAA	TAGAGAGA	
2220	UCUCUUAAC	A	ACCAAGAA			UUUCUGGU	CUGAUGAG	X	CGAA	TUAAAGAA	

Table 63

2223	CUUACAAC	C	AAGAACAU		AUGUUCUU	CUGAUGAG	X	CGAA	UUUGUAG	
2224	UUACRACC	A	AGAACAUI		AAUGUUCU	CUGAUGAG	X	CGAA	IGUUGUAA	
2230	CCAAGAAC	A	UUAUCUUA		UAAGAUA	CUGAUGAG	X	CGAA	IUUCUUGG	
2236	ACAUUAUC	U	UAGUGGAA		UUCACUA	CUGAUGAG	X	CGAA	IAUAAUGU	

Input Sequence = PRKCA. Cut Site = CH/.

Stem Length = 8. Core Sequence = CUGAUGAG X CGAA (X = GCCGUUAGGC or other stem II)

PRKCA (Homo sapiens protein kinase C, alpha (PRKCA) mRNA.; 2245 bp)

Table 64

Table 64: Activity of ribozyme core substituted analogues**A**

RYH/	All ribo I-15.1 K_{obs} (min^{-1})	G-5, A-6, G-8, G-12, I-15.1 ribo 2'-O-allyl environment K_{obs} (min^{-1})		
		U-4=ribo U	U-4=2'-amino U	U-4=2'-O-alkyl U
GCA	0.39	0.10	0.08	0.02
GCC	0.19	0.03	0.01	0.003
GCU	0.028	0.025	0.013	0.002

B

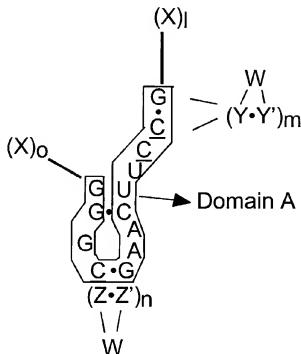
RYH/	All ribo A-15.1 K_{obs} (min^{-1})	G-5, A-6, G-8, G-12, A-15.1 ribo 2'-O-allyl environment K_{obs} (min^{-1})		
		U-4=ribo U	U-4=2'-amino U	U-4=2'-O-alkyl U
GUA	0.12	0.06	0.04	0.01
GUC	0.15	0.015	0.014	0.001
GUU	0.04	0.031	0.012	0.008

Comparison of single turnover cleavage rates for GCH and GUH substrates with I-15.1 and A-15.1 ribozymes and ribozyme analogs. Conditions: Single turnover (250 nM substrate, 2.5 μM ribozyme) pH 6.0, 37 °C, 10 mM Mg^{++}

Claims:

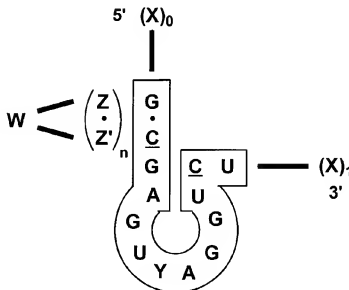
We claim:

- 5 1. An enzymatic nucleic acid molecule having formula 4 namely:



wherein each X, Y, and Z represents independently a nucleotide which may be the same or different; l is an integer greater than or equal to 3; m is an integer greater than 1; n is an integer greater than 1; 0 is an integer greater than or equal to 3; Z' is a nucleotide complementary to Z; Y' is a nucleotide complementary to Y; each X(l) and X(o) are oligonucleotides which are of sufficient length to stably interact independently with a target nucleic acid sequence; W is a linker of ≥ 2 nucleotides; A, U, G, and C represent nucleotides; C is 2'-amino; and ___ represents a chemical linkage.

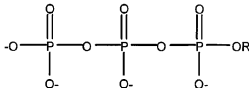
2. An enzymatic nucleic acid molecule having formula 5 namely:



- 5 wherein each X, Y, and Z represents independently a nucleotide which may be the same or different; l is an integer greater than or equal to 3; n is an integer greater than 1; 0 is an integer greater than or equal to 3; Z' is a nucleotide complementary to Z; each $X_{(l)}$ and $X_{(o)}$ are oligonucleotides which are of sufficient length to stably interact independently with a target nucleic acid sequence; W is a linker of ≥ 2 nucleotides in
 10 length or may be a non-nucleotide linker; A, U, G, and C represent nucleotides; \underline{C} is 2'-amino; and --- represents a chemical linkage.
3. The enzymatic nucleic acid molecule of claims 1 or 2, wherein l is selected from the group consisting of 4, 5, 6, 7, 8, 9, 10, 11, 12, and 15.
4. The enzymatic nucleic acid molecule of claim 1, wherein m is selected from the
 15 group consisting of 2, 3, 4, 5, 6, and 7.
5. The enzymatic nucleic acid molecule of claims 1 or 2, wherein n is selected from the group consisting of 2, 3, 4, 5, 6, and 7.
6. The enzymatic nucleic acid molecule of claims 1 or 2, wherein o is selected from the group consisting of 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 15.

7. The enzymatic nucleic acid molecule of claims 1 or 2, wherein l and o are of the same length.
8. The enzymatic nucleic acid molecule of claims 1 or 2, wherein l and o are of different length.
- 5 9. The enzymatic nucleic acid molecule of claims 1 or 2, wherein the target nucleic acid sequence is selected from the group consisting of an RNA, DNA and RNA/DNA mixed polymer.
10. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said chemical linkage is selected from the group consisting of phosphate ester linkage, amide linkage, phosphorothioate, and phosphorodithioate.
- 10 11. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said C is selected from the group consisting of 2'-deoxy-2'-NH₂ and 2'-deoxy-2'-O-NH₂.
12. A method for inhibiting expression of a gene in a cell, comprising the step of administering to said cell the enzymatic nucleic acid molecule of claims 1 or 2 under conditions suitable for said inhibition.
- 15 13. A method of cleaving a separate RNA molecule comprising, contacting the enzymatic nucleic acid molecule of claims 1 or 2 with said separate RNA molecule under conditions suitable for the cleavage of said separate RNA molecule.
14. The method of claim 13, wherein said cleavage is carried out in the presence of a divalent cation.
- 20 15. The method of claim 14, wherein said divalent cation is Mg²⁺.
16. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule is chemically synthesized.
17. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule comprises at least one ribonucleotide.
- 25 18. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule comprises no ribonucleotide residues.
19. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule comprises at least one 2-amino modification.

20. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule comprises at least three phosphorothioate modifications.
21. The enzymatic nucleic acid molecule of claim 20, wherein said phosphorothioate modification is at the 5'-end of said enzymatic nucleic acid molecule.
22. The enzymatic nucleic acid molecule of claims 1 or 2, wherein said enzymatic nucleic acid molecule comprises a 5'-cap or a 3'-cap or both a 5'-cap and a 3'-cap.
23. The enzymatic nucleic acid molecule of claim 22, wherein said 5-cap is phosphorothioate modification.
24. The enzymatic nucleic acid molecule of claim 22, wherein said 3'-cap is an inverted abasic moiety.
25. A compound having the formula 3:



- wherein R is independently any nucleoside selected from the group consisting of 2'-*O*-methyl-2,6-diaminopurine riboside; 2'-deoxy-2'-amino-2,6-diaminopurine riboside; 2'-*(N*-alanyl) amino-2'-deoxy-uridine; 2'-*(N*-phenylalanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-*(N*-β-alanyl) amino ; 2'-deoxy-2'-*(*lysyl) amino uridine; 2'-*C*-allyl uridine; 2'-*O*-amino-uridine; 2'-*O*-methylthiomethyl adenosine; 2'-*O*-methylthiomethyl cytidine ; 2'-*O*-methylthiomethyl guanosine; 2'-*O*-methylthiomethyl-uridine; 2'-deoxy-2'-*(N*-histidyl) amino uridine; 2'-deoxy-2'-amino-5-methyl cytidine; 2'-*(N*-β-carboxamidine-β-alanyl)amino-2'-deoxy-uridine; 2'-deoxy-2'-*(N*-β-alanyl)-guanosine; 2'-*O*-amino-adenosine; 2'-*(N*-lysyl)amino-2'-deoxy-cytidine; 2'-Deoxy -2'-*(*L-histidine) amino Cytidine; 5-Imidazoleacetic acid 2'-deoxy uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropynyl]-2'-*O*-methyl uridine, 5-(3-aminopropynyl)-2'-*O*-methyl uridine, 5-(3-aminopropyl)-2'-*O*-methyl uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropyl]-2'-*O*-methyl uridine, 5-(3-aminopropyl)-2'-deoxy-2-fluoro uridine, 2'-Deoxy-2'-*(*β-alanyl-L-histidyl)amino uridine, 2'-deoxy-2'-β-alaninamido-uridine, 3-(2'-deoxy-2'-fluoro-β-D-ribofuranosyl)piperazino[2,3-D]pyrimidine-2-one, 5-[3-(*N*-4-imidazoleacetyl)aminopropyl]-2'-deoxy-2'-fluoro uridine, 5-[3-(*N*-4-imidazoleacetyl)aminopropynyl]-2'-deoxy-2'-fluoro uridine, 5-E-

(2-carboxyvinyl-2'-deoxy-2'-fluoro uridine, 5-[3-(N-4-aspartyl)aminopropynyl-2'-fluoro uridine, 5-(3-aminopropyl)-2'-deoxy-2'-fluoro cytidine, and 5-[3-(N-4-succinyl)aminopropyl-2'-deoxy-2'-fluoro cytidine.

26. A process for incorporation of the compounds of claim 25 into an oligonucleotide comprising the step of contacting said compound with a mixture comprising a nucleic acid template, an RNA polymerase enzyme, and an enhancer of modified nucleotide triphosphate incorporation, under conditions suitable for the incorporation of said compound into said oligonucleotide.
27. The process of claim 26, wherein said RNA polymerase is a T7 RNA polymerase.
28. The process of claim 26, wherein said RNA polymerase is a mutant T7 RNA polymerase.
29. The process of claim 26, wherein said RNA polymerase is a SP6 RNA polymerase.
30. The process of claim 26, wherein said RNA polymerase is a mutant SP6 RNA polymerase.
31. The process of claim 26, wherein said RNA polymerase is a T3 RNA polymerase.
32. The process of claim 26, wherein said RNA polymerase is a mutant T3 RNA polymerase.
33. The process of claim 26, wherein said enhancer of modified nucleotide triphosphate incorporation is selected from the group consisting of LiCl, methanol, polyethylene glycol, diethyl ether, propanol, methylamine, and ethanol.
34. A process for the synthesis of a pyrimidine nucleotide triphosphate comprising the steps of:
- a. monophosphorylation, wherein a pyrimidine nucleoside is contacted with a mixture comprising a phosphorylating reagent, a trialkyl phosphate and dimethylaminopyridine, under conditions suitable for the formation of a pyrimidine nucleotide monophosphate; and
 - b. pyrophosphorylation, wherein said pyrimidine monophosphate from step (a) is contacted with a pyrophosphorylating reagent under conditions suitable for the formation of said pyrimidine nucleotide triphosphate.

35. The process of claim 34, wherein said pyrimidine nucleoside triphosphate is uridine triphosphate.
36. The process of claim 34, wherein said uridine triphosphate has a 2'-sugar modification.
- 5 37. The process of claim 36, wherein said uridine triphosphate is 2'-*O*-methylthiomethyl uridine triphosphate.
38. The process of claim 34, wherein said phosphorylating agent is selected from the group consisting of phosphorus oxychloride, phospho-tris-triazolides and phospho-tris-triimidazolides.
- 10 39. The process of claim 34, wherein said trialkylphosphate is triethyl phosphate.
40. The process of claim 34, wherein said pyrophosphorylating reagent is tributyl ammonium pyrophosphate.
41. The process of claim 26, wherein said oligonucleotide is RNA.
42. The process of claim 26, wherein said oligonucleotide is an enzymatic nucleic acid
15 molecule.
43. The process of claim 26, wherein said oligonucleotide is an aptamer.
44. A kit for synthesis of an oligonucleotide comprising an RNA polymerase, an enhancer of modified nucleotide triphosphate incorporation and at least one compound of claim 25.
- 20 45. A kit for synthesis of an oligonucleotide comprising a DNA polymerase, an enhancer of modified nucleotide triphosphate incorporation and at least one compound of claim 25.
46. The kit of claim 44, wherein said RNA polymerase is a bacteriophage T7 RNA polymerase.
- 25 47. The kit of claim 44, wherein said RNA polymerase is a bacteriophage SP6 RNA polymerase.
48. The kit of claim 44, wherein said RNA polymerase is a bacteriophage T3 RNA polymerase.

49. The kit of claim 44, wherein said RNA polymerase is a mutant T7 RNA polymerase.
50. The kit of claim 44 or 45, wherein said kit comprises at least two different compounds of claim 25.
51. A nucleic acid catalyst comprising a histidyl modification, wherein said nucleic acid catalyst is able to catalyze an endonuclease reaction in the absence of a metal ion co-factor.
52. The nucleic acid catalyst of claim 51, wherein said catalyst is able to cleave a separate nucleic acid molecule.
53. The nucleic acid catalyst of claim 52, wherein said separate nucleic acid molecule is an RNA molecule.
54. The nucleic acid catalyst of claim 52, wherein said separate nucleic acid molecule is a DNA molecule.
55. The nucleic acid catalyst of claim 51, wherein said nucleic acid catalyst comprises at least one ribonucleotide.
56. The enzymatic nucleic acid molecule of claim 2, wherein said nucleic acid molecule has an endonuclease activity to cleave RNA of HER2 gene.
57. The enzymatic nucleic acid molecule of claim 56, wherein said nucleic acid molecule comprises sequences complementary to any of substrate sequences defined as Target sequence in Tables 58, 59 and 62.
58. The enzymatic nucleic acid molecule of claim 56, wherein said nucleic acid molecule comprises any of ribozyme sequences defined as Ribozyme sequence in Tables 58, 59 and 62.
59. A method for treating cancer using the enzymatic nucleic acid molecule of claim 56.
60. The method of claim 59, wherein said cancer is breast cancer.
61. A method for treating conditions associated with the level of HER2 gene using the enzymatic nucleic acid molecule of claim 56.

62. The enzymatic nucleic acid molecule of claim 56, wherein said enzymatic nucleic acid molecule comprises a substrate binding region which has between 5 and 30 nucleotides complementary to the RNA.
63. The enzymatic nucleic acid molecule of claim 56, wherein said enzymatic nucleic acid molecule comprises a substrate binding region which has between 7 and 12 nucleotides complementary to the RNA.
64. A mammalian cell including the enzymatic nucleic acid molecule of claim 56.
65. The mammalian cell of claim 64, wherein said mammalian cell is a human cell.
66. A mammalian cell including the enzymatic nucleic acid molecule of claims 1 or 2.
67. The mammalian cell of claim 66, wherein said mammalian cell is a human cell.
68. A method for inhibiting expression of HER2 gene in a cell, comprising the step of administering to said cell the enzymatic nucleic acid molecule of claim 56 under conditions suitable for said inhibition.
69. A method of cleaving RNA derived from HER2 gene comprising, contacting the enzymatic nucleic acid molecule of claim 56 with said RNA molecule under conditions suitable for the cleavage of said RNA molecule.
70. A pharmaceutical composition comprising the enzymatic nucleic acid molecule of any of claims 1 or 2.
71. A pharmaceutical composition comprising the enzymatic nucleic acid molecule of claim 56.
72. A method of treatment of a patient having a condition associated with the level of HER2, wherein said patient is administered the enzymatic nucleic acid molecule of claim 56 under conditions suitable for said treatment.
73. The method of claim 72, wherein said method is performed in conjunction with one or more other therapies.
74. The method of claim 59, wherein said enzymatic nucleic acid molecule is used in conjunction with one or more other therapies.
75. The enzymatic nucleic acid molecule of claim 56, wherein said enzymatic nucleic acid molecule comprises at least one sugar modification.

76. The enzymatic nucleic acid molecule of claim 56, wherein said enzymatic nucleic acid molecule comprises at least one nucleic acid base modification.
77. The enzymatic nucleic acid molecule of claim 56, wherein said enzymatic nucleic acid molecule comprises at least one phosphate backbone modification.
- 5 78. The enzymatic nucleic acid molecule of claim 56, wherein said phosphate backbone modification is selected from the group consisting of phosphorothioate, phosphorodithioate and amide.
79. An enzymatic nucleic acid molecule which down regulates expression of genes selected from the group consisting of beta site APP-cleaving enzyme (BACE) and telomerase reverse transcriptase (TERT) genes.
- 10 80. The enzymatic nucleic acid molecule of claim 79, wherein said gene is the beta site APP-cleaving enzyme (BACE).
81. The enzymatic nucleic acid molecule of claim 79, wherein said gene is the telomerase reverse transcriptase (TERT).
- 15 82. A nucleic acid molecule which down regulates expression of genes selected from the group consisting of protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
83. The nucleic acid molecule of claim 82, wherein said nucleic acid molecule is an enzymatic nucleic acid molecule.
- 20 84. The nucleic acid molecule of claim 82, wherein said nucleic acid molecule is an antisense nucleic acid molecule.
85. The nucleic acid molecule of any of claims 82-84, wherein said gene is the protein-tyrosine phosphatase-1B (PTP-1B).
- 25 86. The nucleic acid molecule of any of claims 82-84, wherein said gene is the methionine aminopeptidase (MetAP-2).
87. The nucleic acid molecule of any of claims 82-84, wherein said gene is the hepatitis B virus (HBV).

88. The nucleic acid molecule of any of claims 82-84, wherein said gene is the phospholamban (PLN).
89. The nucleic acid molecule of any of claims 82-84, wherein said gene is the presenilin (ps-2).
- 5 90. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is adapted for use to treat diseases and conditions related to the expression of genes selected from the group consisting of beta site APP-cleaving enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2),
10 hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
91. The nucleic acid molecule of claim 82, wherein said nucleic acid molecule is adapted for use to treat diseases and conditions related to the expression of genes selected from the group consisting of protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban
15 (PLN), and presenilin (ps-2) genes.
92. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule has an endonuclease activity to cleave RNA encoded by said beta site APP-cleaving enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine phosphatase-1B (PTP-1B), methionine
20 aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
93. The enzymatic nucleic acid of any of claims 79 or 83, wherein a binding arm of said enzymatic nucleic acid molecule comprise sequences complementary to any of the sequences defined as Target or Substrate sequence in Tables 3-30, and 36-43.
25
94. The enzymatic nucleic acid molecule of any of claims 79 or 83 wherein said enzymatic nucleic acid molecule comprises any of the sequences defined as Ribozyme or DNAzyme sequence in Tables 3-29, and 37-43.
95. The nucleic acid molecule of claim 84, wherein said antisense nucleic acid
30 molecule comprises sequence complementary to any of the sequences defined as Target or Substrate sequence in Tables 3-12, 24-30, and 36-43.

96. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in a hammerhead (HH) motif.
97. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in a zinzyme (Class II) motif.
- 5 98. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in an amberzyme (Class I) motif.
99. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in a hairpin, hepatitis Delta virus, group I intron, VS nucleic acid, or RNase P nucleic acid motif.
- 10 100. The enzymatic nucleic acid molecule of claim 97, wherein said zinzyme motif comprises sequences complementary to any of the substrate sequences shown in Tables 21, 27 and 40.
101. The enzymatic nucleic acid molecule of claim 98, wherein said amberzyme motif comprises sequences complementary to any of the substrate sequences shown in Tables 23, 29, and 42.
- 15 102. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in a NCH motif.
103. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is in a G-cleaver motif.
- 20 104. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule is a DNAzyme.
105. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule comprises between 12 and 100 bases complementary to the RNA of genes selected from the group consisting of beta site APP-cleaving enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
- 25 106. The enzymatic nucleic acid of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule comprises between 14 and 24 bases complementary to the RNA of genes selected from the group consisting of beta site APP-cleaving enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine
- 30

phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.

107. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid is chemically synthesized.
- 5 108. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid comprises at least one 2'-sugar modification.
109. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid comprises at least one nucleic acid base modification.
- 10 110. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid comprises at least one phosphate backbone modification.
111. A mammalian cell including the enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said mammalian cell is not a living human.
112. The mammalian cell of claim 111, wherein said mammalian cell is a human cell.
- 15 113. The antisense nucleic acid molecule of claim 84, wherein said antisense nucleic acid is chemically synthesized.
114. The antisense nucleic acid molecule of claim 84, wherein said antisense nucleic acid comprises at least one 2'-sugar modification.
115. The antisense nucleic acid molecule of claim 84, wherein said antisense nucleic acid comprises at least one nucleic acid base modification.
- 20 116. The antisense nucleic acid molecule of claim 84, wherein said antisense nucleic acid comprises at least one phosphate backbone modification.
117. A mammalian cell including the antisense nucleic acid molecule of claim 84, wherein said mammalian cell is not a living human.
- 25 118. The mammalian cell of claim 117, wherein said mammalian cell is a human cell.
119. A method of reducing BACE activity in a cell, comprising the step of contacting said cell with the enzymatic nucleic acid molecule of claim 80, under conditions suitable for said inhibition.

120. A method of reducing TERT activity in a cell, comprising the step of contacting said cell with the enzymatic nucleic acid molecule of claim 81, under conditions suitable for said inhibition.
121. A method of reducing PTP-1B activity in a cell, comprising the step of
5 contacting said cell with the nucleic acid molecule of claim 85, under conditions suitable for said inhibition.
122. A method of reducing MetAP-2 activity in a cell, comprising the step of contacting said cell with the nucleic acid molecule of claim 86, under conditions suitable for said inhibition.
- 10 123. A method of reducing HBV activity in a cell, comprising the step of contacting said cell with the nucleic acid molecule of claim 87, under conditions suitable for said inhibition.
124. A method of reducing phospholamban (PLN) activity in a cell, comprising the step of contacting said cell with the nucleic acid molecule of claim 88, under
15 conditions suitable for said inhibition.
125. A method of reducing presenilin-2 (ps-2) activity in a cell, comprising the step of contacting said cell with the nucleic acid molecule of claim 89, under conditions suitable for said inhibition.
126. A method of treatment of a patient having a condition associated with the level
20 of BACE, comprising contacting cells of said patient with the enzymatic nucleic acid molecule of claim 80, under conditions suitable for said treatment.
127. A method of treatment of a patient having a condition associated with the level of TERT, comprising contacting cells of said patient with the enzymatic nucleic acid molecule of claim 81, under conditions suitable for said treatment.
- 25 128. A method of treatment of a patient having a condition associated with the level of PTP-1B, comprising contacting cells of said patient with the nucleic acid molecule of claim 85, under conditions suitable for said treatment.
129. A method of treatment of a patient having a condition associated with the level of MetAP-2, comprising contacting cells of said patient with the nucleic acid
30 molecule of claim 86, under conditions suitable for said treatment.

130. A method of treatment of a patient having a condition associated with the level of HBV, comprising contacting cells of said patient with the nucleic acid molecule of claim 87, under conditions suitable for said treatment.
131. A method of treatment of a patient having a condition associated with the level of phospholamban (PLN), comprising contacting cells of said patient with the
5 nucleic acid molecule of claim 88, under conditions suitable for said treatment.
132. A method of treatment of a patient having a condition associated with the level of presenilin-2 (ps-2), comprising contacting cells of said patient with the nucleic acid molecule of claim 89, under conditions suitable for said treatment.
- 10 133. The method of any of claims 126-132 further comprising the use of one or more drug therapies under conditions suitable for said treatment.
134. A method of cleaving RNA of BACE gene, comprising, contacting the enzymatic nucleic acid molecule of claim 80, with said RNA under conditions suitable for the cleavage of said RNA.
- 15 135. A method of cleaving RNA of TERT gene, comprising, contacting the enzymatic nucleic acid molecule of claim 81, with said RNA under conditions suitable for the cleavage of said RNA.
136. A method of cleaving RNA of PTP-1B gene, comprising, contacting the enzymatic nucleic acid molecule of claim 85, with said RNA under conditions
20 suitable for the cleavage of said RNA.
137. A method of cleaving RNA of MetAP-2 gene, comprising, contacting the enzymatic nucleic acid molecule of claim 86, with said RNA under conditions suitable for the cleavage of said RNA.
138. A method of cleaving RNA of HBV gene, comprising, contacting the
25 enzymatic nucleic acid molecule of claim 87, with said RNA under conditions suitable for the cleavage of said RNA.
139. A method of cleaving RNA of phospholamban (PLN) gene, comprising, contacting the enzymatic nucleic acid molecule of claim 88, with said RNA under conditions suitable for the cleavage of said RNA.

140. A method of cleaving RNA of presenilin-2 (ps-2) gene, comprising, contacting the enzymatic nucleic acid molecule of claim 89, with said RNA under conditions suitable for the cleavage of said RNA.
141. The method of any of claims 134-140, wherein said cleavage is carried out in the presence of a divalent cation.
142. The method of claim 141, wherein said divalent cation is Mg^{2+} .
143. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid comprises a cap structure, wherein the cap structure is at the 5'-end or 3'-end or both the 5'-end and the 3'-end.
144. The antisense nucleic acid molecule of claim 84, wherein said antisense nucleic acid comprises a cap structure, wherein the cap structure is at the 5'-end or 3'-end or both the 5'-end and the 3'-end.
145. The enzymatic nucleic acid molecule of claim 96, wherein said hammerhead motif comprises sequences complementary to any of sequences defined as Target or Substrate sequences in Tables 3, 9, 13, 18, 24, and 37.
146. The enzymatic nucleic acid molecule of claim 102, wherein said NCH motif comprises sequences complementary to any of sequences defined as Target or Substrate sequences in Tables 4, 10, 14, 19, 25, and 38.
147. The enzymatic nucleic acid molecule of claim 103, wherein said G-cleaver motif comprises sequences complementary to any of sequences defined as Target or Substrate sequences in Tables 5, 11, 15, 20, 26, and 39.
148. The enzymatic nucleic acid molecule of claim 104, wherein said DNAzyme comprises sequences complementary to any of sequences defined as Target or Substrate sequences in Tables 6, 16, 22, 28, and 41.
149. The method of any of claims 119-125 or 133, wherein said enzymatic nucleic acid molecule is in a hammerhead motif.
150. The method of any of claims 119-125 or 133, wherein said nucleic acid molecule is a DNAzyme.

151. An expression vector comprising nucleic acid sequence encoding at least one enzymatic nucleic acid molecule of any of claims 79 or 83, in a manner which allows expression of that enzymatic nucleic acid molecule.
152. An expression vector comprising nucleic acid sequence encoding at least one
5 antisense nucleic acid molecule of claim 84, in a manner which allows expression of that antisense nucleic acid molecule.
153. A mammalian cell including an expression vector of any of claims 151 or 152, wherein said mammalian cell is not a living human.
154. The mammalian cell of claim 153, wherein said mammalian cell is a human
10 cell.
155. The expression vector of claim 151, wherein said enzymatic nucleic acid molecule is in a hammerhead motif.
156. The expression vector of claim 151, wherein said expression vector further comprises a sequence for an antisense nucleic acid molecule complementary to the
15 RNA of genes selected from the group consisting of beta site APP-cleaving enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
157. The expression vector of claim 151, wherein said expression vector comprises
20 sequence encoding at least two said enzymatic nucleic acid molecules, which may be same or different.
158. The expression vector of claim 157, wherein one said expression vector further comprises sequence encoding antisense nucleic acid molecule complementary to the RNA of genes selected from the group consisting of beta site APP-cleaving
25 enzyme (BACE), telomerase reverse transcriptase (TERT), protein-tyrosine phosphatase-1B (PTP-1B), methionine aminopeptidase (MetAP-2), hepatitis B virus (HBV), phospholamban (PLN), and presenilin (ps-2) genes.
159. A method for treatment of Alzheimer's disease comprising the step of
30 administering to a patient the enzymatic nucleic acid molecule of claim 80 under conditions suitable for said treatment.

160. The method of claim 159, wherein said treatment of Alzheimer's disease is treatment of dementia.
161. A method for treatment of Alzheimer's disease comprising the step of administering to a patient the antisense nucleic acid molecule of claim 89 under conditions suitable for said treatment.
162. A method for treatment of diabetes comprising the step of administering to a patient the nucleic acid molecule of claim 85 under conditions suitable for said treatment.
163. The method of claim 162, wherein said diabetes is type I diabetes.
164. The method of claim 162, wherein said diabetes is type II diabetes.
165. A method for treatment of diabetes comprising the step of administering to a patient the antisense nucleic acid molecule of claim 85 under conditions suitable for said treatment.
166. A method for treatment of obesity comprising the step of administering to a patient the nucleic acid molecule of claim 85 under conditions suitable for said treatment.
167. A method for treatment of obesity comprising the step of administering to a patient the antisense nucleic acid molecule of claim 85 under conditions suitable for said treatment.
168. A method for treatment of heart disease comprising the step of administering to a patient the nucleic acid molecule of claim 88 under conditions suitable for said treatment.
169. The method of claim 168, wherein said heart disease is heart failure.
170. The method of claim 168, wherein said heart disease is congestive heart failure.
171. A method for treatment of pressure overload hypertrophy, or dilated cardiomyopathy, or both, comprising the step of administering to a patient the nucleic acid molecule of claim 88 under conditions suitable for said treatment.

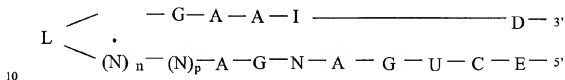
172. A method for treatment of cancer comprising the step of administering to a patient the nucleic acid molecule of claim 86 under conditions suitable for said treatment.
173. A method for treatment of hepatitis comprising the step of administering to a patient the nucleic acid molecule of claim 87 under conditions suitable for said treatment.
174. A method for treatment of hepatocellular carcinoma comprising the step of administering to a patient the nucleic acid molecule of claim 87 under conditions suitable for said treatment.
175. The method of claim 159, wherein said enzymatic nucleic acid molecule is in a hammerhead motif.
176. The method of claim 159, wherein said method further comprises administering to said patient the enzymatic nucleic acid molecule in conjunction with one or more of other therapies.
177. The method of any of claims 162, 165-168, or 171-174, wherein said nucleic acid molecule is an enzymatic nucleic acid molecule.
178. The method of any of claims 162, 166-168, or 171-174, wherein said nucleic acid molecule is an antisense nucleic acid molecule.
179. The method of any of claims 162, 165-168, or 171-174, wherein said method further comprises administering to said patient the nucleic acid molecule in conjunction with one or more of other therapies.
180. The enzymatic nucleic acid molecule of any of claims 79 or 83, wherein said enzymatic nucleic acid molecule comprises at least five ribose residues; at least ten 2'-O-methyl modifications, and a 3'- end modification.
181. The enzymatic nucleic acid molecule of claim 180, wherein said enzymatic nucleic acid molecule further comprises phosphorothioate linkages on at least three of the 5' terminal nucleotides.
182. The enzymatic nucleic acid molecule of claim 180, wherein said 3'- end modification is 3'-3' inverted abasic moiety.

183. The enzymatic nucleic acid molecule of claim 104, wherein said DNAzyme comprises at least ten 2'-O-methyl modifications and a 3'-end modification.

184. The enzymatic nucleic acid molecule of claim 183, wherein said DNAzyme further comprises phosphorothioate linkages on at least three of the 5' terminal nucleotides.

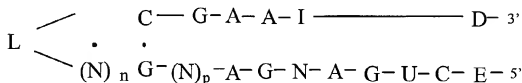
185. The enzymatic nucleic acid molecule of claim 183, wherein said 3'- end modification is 3'-3' inverted abasic moiety.

186. An enzymatic nucleic acid molecule having formula 1:



wherein N represents independently a nucleotide or a non-nucleotide linker, which may be same or different; D and E are independently oligonucleotides of length sufficient to stably interact with a target RNA molecule; o and n are integers independently greater than or equal to 1, wherein if (N)o and (N)n are nucleotides, (N)o and (N)n are optionally able to interact by hydrogen bond interaction; • indicates base-paired interaction; L is a linker which may be present or absent, but when present, is a nucleotide linker, a non-nucleotide linker, or a combination of nucleotide and a non-nucleotide linker; p is an integer 0 or 1; represents a chemical linkage; and A, U, I, C and G represent adenosine, uridine, inosine, cytidine and guanosine nucleotides, respectively.

187. An enzymatic nucleic acid molecule having formula 2:



wherein N represents independently a nucleotide or a non-nucleotide linker, which may be same or different; D and E are independently oligonucleotides of length sufficient to stably interact with a target RNA molecule; o and n are integers independently greater than or equal to 0, wherein if (N)o and (N)n are nucleotides,

(N)o and (N)n are optionally able to interact by hydrogen bond interaction; • indicates base-paired interaction; L is a linker which may be present or absent, but when present, is a nucleotide linker, a non-nucleotide linker, or a combination of nucleotide and a non-nucleotide linker; p is an integer 0 or 1; represents a chemical linkage; and A, U, I, C and G represent adenosine, uridine, inosine, cytidine and guanosine nucleotides, respectively.

188. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said D and E are independently of length selected from the group consisting of 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, and 20 nucleotides.

189. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said D and E are of the same length.

190. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said D and E are of different length.

191. The enzymatic nucleic acid molecule of claim 186, wherein said o and n are independently integers selected from the group consisting of 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, and 50.

192. The enzymatic nucleic acid molecule of claim 187, wherein said o and n are independently integers selected from the group consisting of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, and 50.

193. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said (N)o and (N)n comprise nucleotides that are complementary to each other.

194. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said (N)o and (N)n are of the same length.

195. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said (N)o and (N)n are of different length.

196. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said L is a nucleotide linker.

197. The enzymatic nucleic acid molecule of claim 196, wherein said nucleotide linker is of length between 3-50 nucleotides.

198. The enzymatic nucleic acid molecule of claim 196, wherein said nucleotide linker is an aptamer.
199. The enzymatic nucleic acid molecule of claim 196 wherein said nucleotide linker is selected from the group consisting of 5'-GAAA-3' and 5'-GUUA-3'.
- 5 200. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said L is a non-nucleotide linker.
201. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said chemical linkage is independently or in combination selected from the group consisting of phosphate ester linkage, amide linkage, phosphorothioate, arabino,
10 arabinofluoro, and phosphorodithioate.
202. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said p is 1.
203. The enzymatic nucleic acid molecule of claim 202, wherein said N of (N)_p is independently selected from the group consisting of adenosine, uridine, and cytidine.
- 15 204. The enzymatic nucleic acid molecule of claims 186 or 187 wherein said enzymatic nucleic acid molecule is chemically synthesized.
205. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule comprises at least three ribonucleotide residues.
206. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said
20 enzymatic nucleic acid molecule comprises at least four ribonucleotide residues.
207. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule comprises at least five ribonucleotide residues.
208. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said I is selected from the group consisting of ribo-inosine and xylo-inosine.
- 25 209. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule comprises at least one sugar modification.
210. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule comprises at least nucleic acid base modification.

211. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule comprises at least one phosphate backbone modification.
212. The enzymatic nucleic acid molecule of claim 209, wherein said sugar
5 modification is selected from the group consisting of 2'-H, 2'-O-methyl, 2'-O-allyl, and 2'-deoxy-2'-amino.
213. The enzymatic nucleic acid molecule of claim 211, wherein said phosphate backbone modification is selected from the group consisting of phosphorothioate, phosphorodithioate and amide.
- 10 214. The enzymatic nucleic acid molecule of claims 186 or 187 wherein said enzymatic nucleic acid molecule comprises a 5'-cap or a 3'-cap or both a 5'-cap and a 3'-cap.
215. The enzymatic nucleic acid molecule of claim 214, wherein said 5'-cap is a phosphorothioate modification of at least one 5'-terminal nucleotide in said
15 enzymatic nucleic acid molecule.
216. The enzymatic nucleic acid molecule of claim 214, wherein said 5'-cap is a phosphorothioate modification of at least two 5'-terminal nucleotide in said enzymatic nucleic acid molecule.
217. The enzymatic nucleic acid molecule of claim 214, wherein said 5'-cap is a
20 phosphorothioate modification of at least three 5'-terminal nucleotide in said enzymatic nucleic acid molecule.
218. The enzymatic nucleic acid molecule of claim 214, wherein said 3'-cap is a 3'-3' inverted abasic moiety.
219. The enzymatic nucleic acid molecule of claim 214, wherein said 3'-cap is a 3'-
25 3' inverted nucleotide moiety.
220. A method for inhibiting expression of a gene in a cell, comprising the step of administering to said cell the enzymatic nucleic acid molecule of claims 186 or 187 under conditions suitable for said inhibition.
221. A method of cleaving a separate RNA molecule comprising, contacting the
30 enzymatic nucleic acid molecule of claims 186 or 187 with said separate RNA

molecule under conditions suitable for the cleavage of said separate RNA molecule.

222. The method of claim 221, wherein said cleavage is carried out in the presence of a divalent cation.
- 5 223. The method of claim 222, wherein said divalent cation is Mg^{2+} .
224. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said enzymatic nucleic acid molecule has an endonuclease activity to cleave RNA derived from HER2 gene.
- 10 225. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises sequences complementary to any of NCH substrate sequence of Table 34.
226. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises any of the NCH ribozyme sequences shown in Table 34.
- 15 227. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule is used to treat cancer.
228. The enzymatic nucleic acid molecule of claim 224, wherein said cancer is breast cancer.
- 20 229. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule is used to treat conditions associated with the level of HER2 gene.
230. An enzymatic nucleic acid molecule, wherein said enzymatic nucleic acid molecule comprises any of sequence shown as NCH ribozyme sequence in Table 31.
- 25 231. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises a substrate binding region which has between 5 and 30 nucleotides complementary to the RNA.
232. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises a substrate binding region which has between 7
30 and 12 nucleotides complementary to the RNA.

233. A mammalian cell including the enzymatic nucleic acid molecule of claim 224, wherein said mammalian cell is not a living human.
234. The mammalian cell of claim 233, wherein said mammalian cell is a human cell.
- 5 235. A mammalian cell including the enzymatic nucleic acid molecule of claims 186 or 187, wherein said mammalian cell is not a living human.
236. The mammalian cell of claim 235, wherein said mammalian cell is a human cell.
- 10 237. A method for inhibiting expression of HER2 gene in a cell, comprising the step of administering to said cell the enzymatic nucleic acid molecule of claim 224 under conditions suitable for said inhibition.
238. A method of cleaving RNA derived from HER2 gene comprising, contacting the enzymatic nucleic acid molecule of claim 224 with said RNA molecule under conditions suitable for the cleavage of said RNA molecule.
- 15 239. A pharmaceutical composition comprising the enzymatic nucleic acid molecule of any of claims 186 or 187.
240. A pharmaceutical composition comprising the enzymatic nucleic acid molecule of claim 224.
241. A method of treatment of a patient having a condition associated with the level
20 of HER2, wherein said patient is administered the enzymatic nucleic acid molecule of claim 224 under conditions suitable for said treatment.
242. The method of claim 241, wherein said method is performed in conjunction with one or more other therapies.
243. The enzymatic nucleic acid molecule of claim 227, wherein said enzymatic
25 nucleic acid molecule is used in conjunction with one or more other therapies.
244. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said nucleic acid molecule comprises at least five ribose residues; a 2'-C-allyl modification at position No. 4 of said enzymatic nucleic acid; at least ten 2'-O-alkyl modifications, and a 3'-cap structure.

245. The enzymatic nucleic acid molecule of claim 244, wherein said 2'-O-alkyl modifications is selected from the group consisting of 2'-O-methyl and 2'-O-allyl.
246. The enzymatic nucleic acid molecule of claim 244, wherein said 3'-cap is 3'-3' inverted abasic moiety.
- 5 247. The enzymatic nucleic acid molecule of claim 244, wherein said 3'-cap is 3'-3' inverted nucleotide.
248. The enzymatic nucleic acid molecule of claim 244, wherein said enzymatic nucleic acid comprises phosphorothioate linkages in at least three of the 5' terminal nucleotides.
- 10 249. The enzymatic nucleic acid molecule of claims 186 or 187, wherein said nucleic acid molecule comprises at least five ribose residues; a 2'-deoxy-2'-amino modification at position Nos. 4 and 7 of said enzymatic nucleic acid; at least ten 2'-O-alkyl modifications, and a 3'- cap structure.
250. The enzymatic nucleic acid molecule of claim 249, wherein said 2'-O-alkyl
15 modifications is selected from the group consisting of 2'-O-methyl and 2'-O-allyl.
251. The enzymatic nucleic acid molecule of claim 249, wherein said 3'-cap is 3'-3' inverted abasic moiety.
252. The enzymatic nucleic acid molecule of claim 249, wherein said 3'-cap is 3'-3' inverted nucleotide.
- 20 253. The enzymatic nucleic acid molecule of claim 249, wherein said enzymatic nucleic acid comprises phosphorothioate linkages in at least three of the 5' terminal nucleotides.
254. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises at least one sugar modification.
- 25 255. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises at least one nucleic acid base modification.
256. The enzymatic nucleic acid molecule of claim 224, wherein said enzymatic nucleic acid molecule comprises at least one phosphate backbone modification.

257. The enzymatic nucleic acid molecule of claim 224, wherein said phosphate backbone modification is selected from the group consisting of phosphorothioate, phosphorodithioate and amide.
258. The enzymatic nucleic acid molecule of claim 224, wherein said nucleic acid molecule comprises at least five ribose residues; a 2'-C-allyl modification at position No. 4 of said enzymatic nucleic acid; at least ten 2'-O-alkyl modifications, and a 3'-cap structure.
259. The enzymatic nucleic acid molecule of claim 258, wherein said 2'-O-alkyl modifications is selected from the group consisting of 2'-O-methyl and 2'-O-allyl.
260. The enzymatic nucleic acid molecule of claim 258, wherein said 3'-cap is 3'-3' inverted abasic moiety.
261. The enzymatic nucleic acid molecule of claim 258, wherein said 3'-cap is 3'-3' inverted nucleotide.
262. The enzymatic nucleic acid molecule of claim 258, wherein said enzymatic nucleic acid comprises phosphorothioate linkages in at least three of the 5' terminal nucleotides.
263. The enzymatic nucleic acid molecule of claim 224, wherein said nucleic acid molecule comprises at least five ribose residues; a 2'-deoxy-2'-amino modification at position Nos. 4 and 7 of said enzymatic nucleic acid; at least ten 2'-O-alkyl modifications, and a 3'-cap structure.
264. The enzymatic nucleic acid molecule of claim 263, wherein said 2'-O-alkyl modifications is selected from the group consisting of 2'-O-methyl and 2'-O-allyl.
265. The enzymatic nucleic acid molecule of claim 263, wherein said 3'-cap is 3'-3' inverted abasic moiety.
266. The enzymatic nucleic acid molecule of claim 263, wherein said 3'-cap is 3'-3' inverted nucleotide.
267. The enzymatic nucleic acid molecule of claim 263, wherein said enzymatic nucleic acid comprises phosphorothioate linkages in at least three of the 5' terminal nucleotides.

268. The enzymatic nucleic acid molecule of claim 186, wherein said enzymatic nucleic acid molecule is capable of down-regulating the expression of protein kinase C alpha (PKC alpha) gene.
269. A method for inhibiting expression of a PKC alpha gene in a cell, comprising
5 the step of administering to said cell the enzymatic nucleic acid molecule of claim 268 under conditions suitable for said inhibition.
270. A method of cleaving a PKC alpha RNA molecule comprising, contacting the enzymatic nucleic acid molecule of claim 268 with said separate PKC alpha RNA molecule under conditions suitable for the cleavage of said PKC alpha RNA
10 molecule.
271. The method of claim 270, wherein said cleavage is carried out in the presence of a divalent cation.
272. The method of claim 271, wherein said divalent cation is Mg^{2+} .
273. The enzymatic nucleic acid molecule of claim 268, wherein said enzymatic
15 nucleic acid molecule has an endonuclease activity to cleave RNA derived from PKC alpha gene.
274. The enzymatic nucleic acid molecule of claim 273, wherein said enzymatic nucleic acid molecule comprises sequences complementary to any of NCH substrate sequence of Table 63.
- 20 275. The enzymatic nucleic acid molecule of claim 273 wherein said enzymatic nucleic acid molecule comprises any of the NCH ribozyme sequences shown in Table 63.
276. The enzymatic nucleic acid molecule of claim 268, wherein said enzymatic nucleic acid molecule is used to treat cancer.
- 25 277. The enzymatic nucleic acid molecule of claim 276, wherein said cancer is selected from the group consisting of lung, breast, colon, prostate, bladder, ovary, melanoma, and glioblastoma cancer.
278. The enzymatic nucleic acid molecule of claim 268, wherein said enzymatic
30 nucleic acid molecule is used to treat conditions associated with the level of PKC alpha gene.

279. The enzymatic nucleic acid molecule of claim 268, wherein said D and E independently has between 5 and 30 nucleotides complementary to the RNA.
280. The enzymatic nucleic acid molecule of claim 268, wherein said D and E independently has between 7 and 12 nucleotides complementary to the RNA.
- 5 281. A mammalian cell including the enzymatic nucleic acid molecule of claim 268, wherein said mammalian cell is not a living human.
282. The mammalian cell of claim 281, wherein said mammalian cell is a human cell.
283. A pharmaceutical composition comprising the enzymatic nucleic acid molecule
10 of claim 238.
284. A pharmaceutical composition comprising the enzymatic nucleic acid molecule of claim 273.
285. A method of treatment of a patient having a condition associated with the level of PKC alpha, wherein said patient is administered the enzymatic nucleic acid
15 molecule of claim 268 under conditions suitable for said treatment.
286. The method of claim 285, wherein said method is performed in conjunction with one or more other therapies.
287. The enzymatic nucleic acid molecule of claim 286, wherein said enzymatic nucleic acid molecule is used in conjunction with one or more other therapies.
- 20 288. An antisense nucleic acid molecule comprising sequence complementary to any of substrate sequence in Tables 13-23.
289. The antisense nucleic acid molecule of claim 288, wherein said enzymatic nucleic acid is chemically synthesized.
290. The antisense nucleic acid molecule of claim 288, wherein said antisense
25 nucleic acid comprises at least one 2'-sugar modification.
291. The antisense nucleic acid molecule of claim 288, wherein said antisense nucleic acid comprises at least one nucleic acid base modification.
292. The antisense nucleic acid molecule of claim 288, wherein said antisense nucleic acid comprises at least one phosphate backbone modification.

293. A mammalian cell including the antisense nucleic acid molecule of claim 288, wherein said mammalian cell is not a living human.
294. The mammalian cell of claim 293, wherein said mammalian cell is a human cell.

Figure 3: 2'-O-Me substituted Amberzyme Enzymatic Nucleic Acid Motif

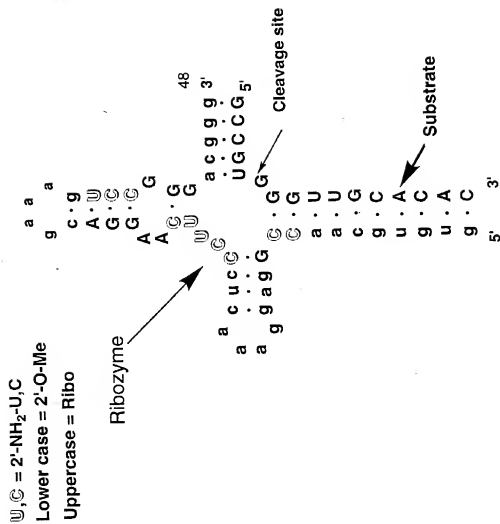
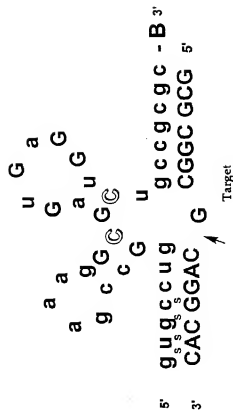


Figure 4: Stabilized Zinzyme Ribozyme Motif

Zinzyme A-motif RZ

**Legend**

Uppercase indicates natural ribo residues

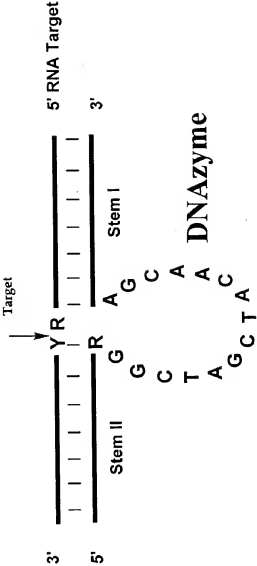
Ⓒ indicates 2' - d-NH₂-C

Lowercase: 2'-O- Me

Subscript _s indicates phosphothioate linkage

B: 3'-3' basic moiety

Figure 5: DNAzyme Motif



Legend

Y = U or C
R = A or G

Figure 7: Examples of Nuclease Stable Ribozyme Motifs

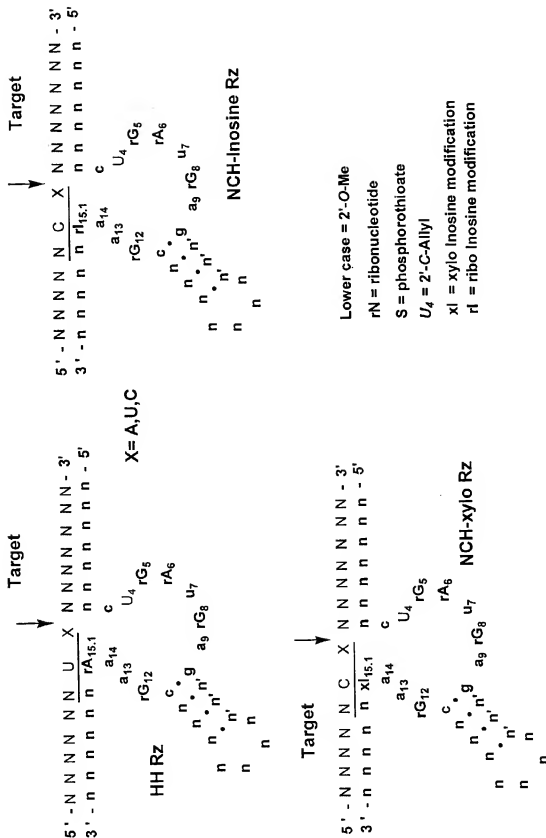


Figure 8: Inhibition of Cell Proliferation by Anti-Her2 Ribozymes

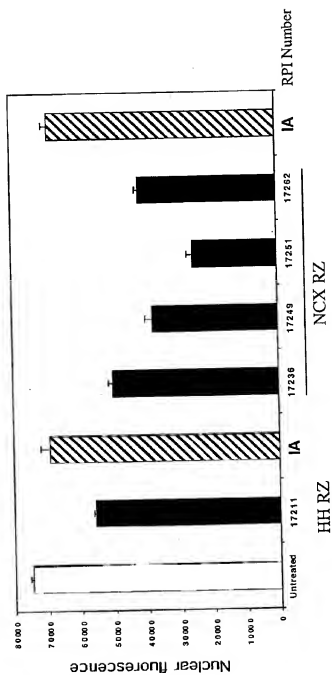
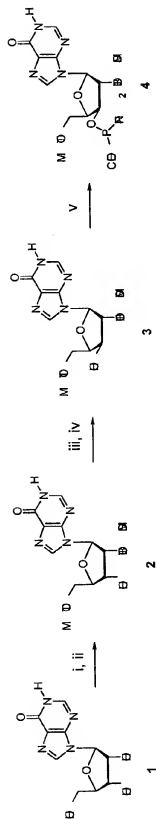


Figure 9: Synthesis of b-D-xylofuranosyl hypoxanthine 3'-phosphoramidite

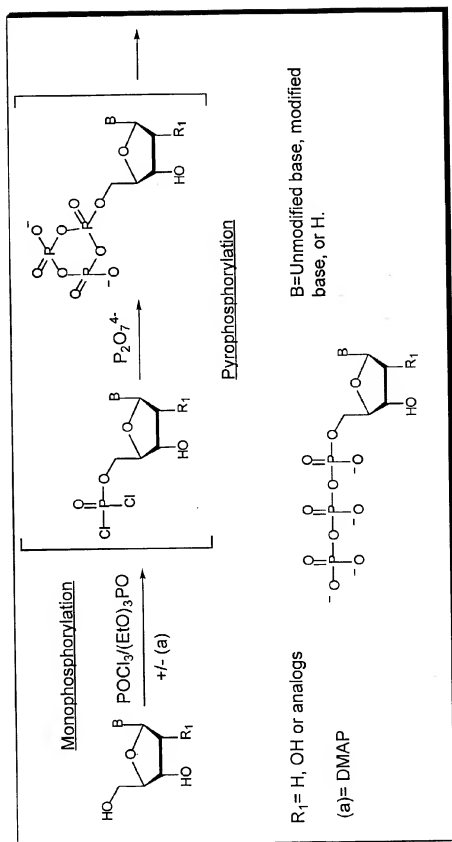


MMT = 4-methoxytriphenylmethyl

TBDMS = *t*-butyldimethylsilyl

Reagents and Conditions: (i) MMT-Cl/Pyr-DMSO, rt, 48 h; (ii) TBDMS-Cl/AgNO₃/Pyr/THF; (iii) C₁₀H₇O₂/Pyr/Ac₂O/DCM, rt, 1 h; (iv) NaB(OAc)₃H/EtOH, rt, overnight; (v) 2-Cyanoethyl-*N,N*-diisopropylchlorophosphoramidite/1-MeIm/DIPEA/DCM, rt, 2 h.

Figure 10: One-Pot Formation of Nucleoside-5'-triphosphates



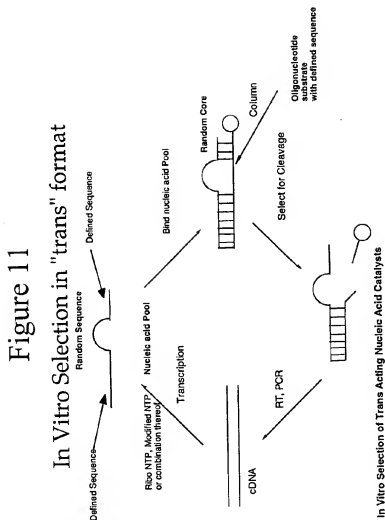


Figure 12. Removal of "parasitic RNA" using a Second Selection column

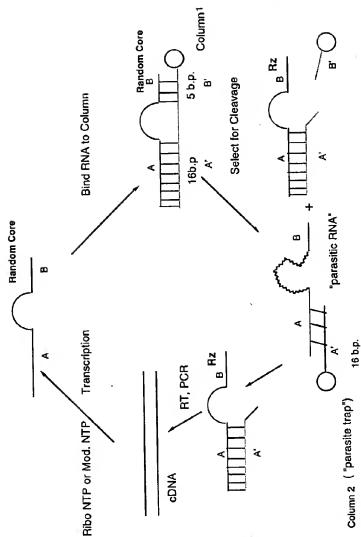


FIGURE 14. Dual Reporter System for Cytoplasmic HCV Target

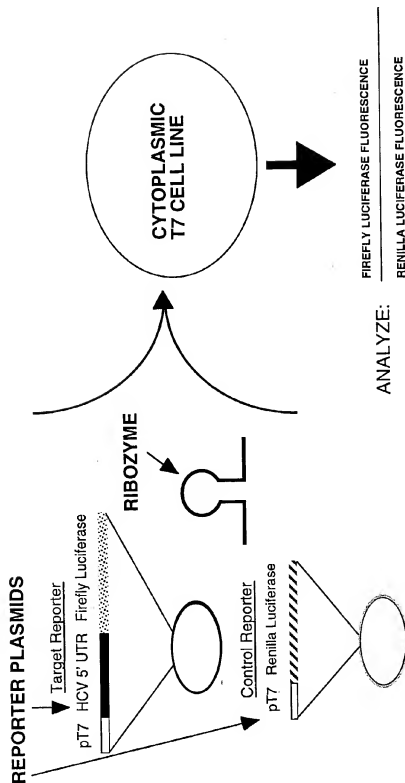


Figure 15. Dose-dependent inhibition of HCV-IRES mediated luciferase activity

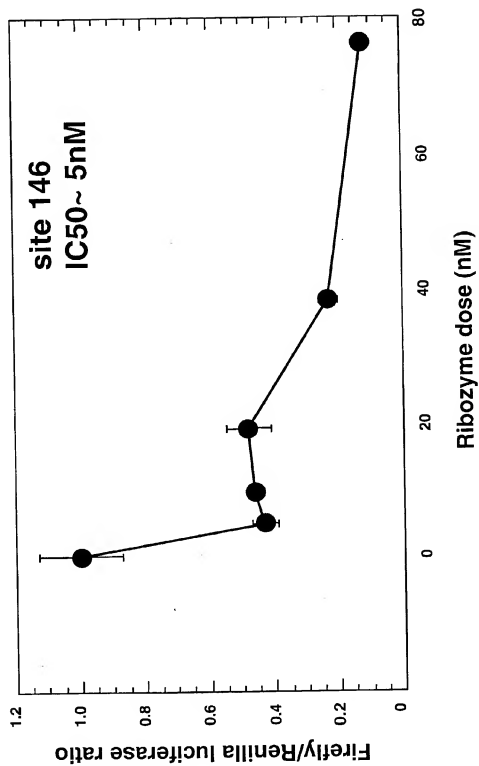
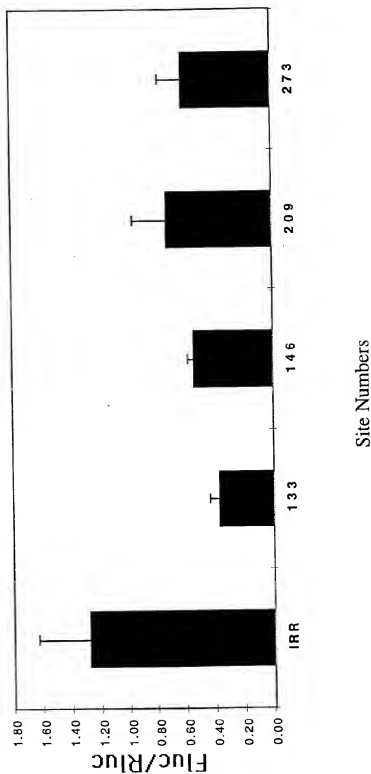


Figure 16. Efficacious Ribozymes Targeting 5'UTR HCV RNA



Sequence and chemical compositions for site numbers are given in table XII

Figure 17. Characterized Class II Enzymatic Nucleic Acid Motifs

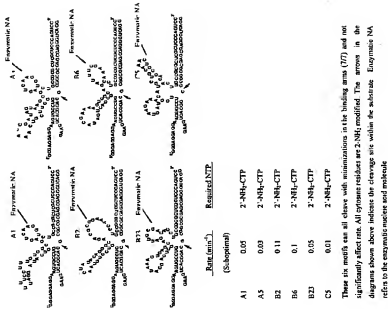
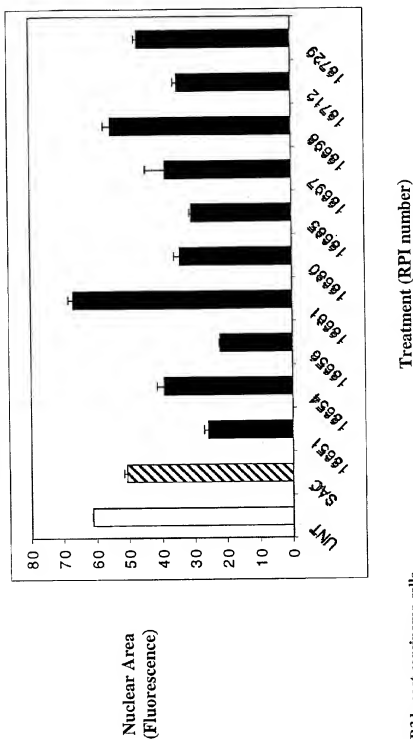
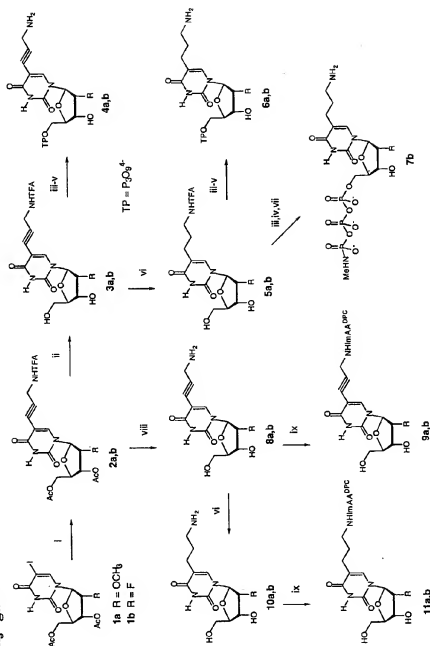


Figure 20: Representative data of HER2 cell proliferation primary screen of Class II (zincyme) Ribozymes



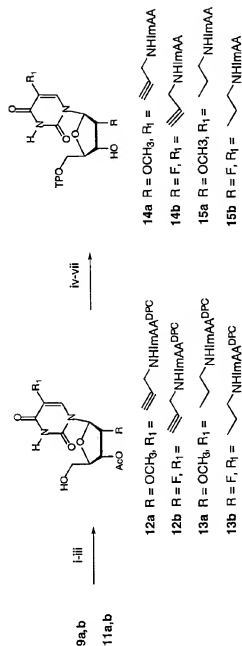
SKBR3 breast carcinoma cells
 2 μ g/mL RPI9649 (lipid)
 200 nM ribozymes
 120 hour timepoint
 UNT = untreated
 SAC = scrambled attenuated control

Figure 21: Synthesis of 5-[3-aminopropynyl(propyl)]uridine 5'-triphosphates and 4-imidazoleacetic acid conjugates



Reagents and Conditions: (i) *N*-TTA propargylamine, CuI, tetrakis(Ph₃P)Pd(0), Et₃N, DMF, 16 h, (ii) aq NaOH, pyr, MeOH, 0 °C, 1 h, (iii) POCl₃, Proton-Sponges, (EtO)₃PO, 2 h, (iv) *n*-Bu₄N PPI, MeCN, 15 min, (v) 1M Et₃NH⁺HCO₃⁻, then NH₄OH, 16 h, (vi) H₂, 5% Pd/C, 24 h, 40 psi, (vii) 40% MeNH₂, 3 h, (viii) NH₄OH, 4 °C, 16 h, (ix) ImAA^{OPC}, EDCHCl, DMF, 16 h.

Figure 22: Synthesis of 5-[3-(N-4-imidazoleacetylaminopropynyl(propyl))uridine 5'-triphosphates



Reagents and Conditions: (I) DMT-Cl, pyr, 16 h, (ii) Ac₂O, pyr, 2 h, (iii) 3%TCA, CH₂Cl₂, 2 h, (iv) 2-Cl-4H-1,3,2-benzodioxaphosphorin-4-one, pyr, dioxane, 30 min., (v) *n*-Bu₃N PPI, DMF, 30 min., (vi) I₂, pyr-H₂O, 20 min., (vii) NH₄OH, 2 h.

Figure 23: Synthesis of Carboxylate tethered uridine 5'-triphosphates

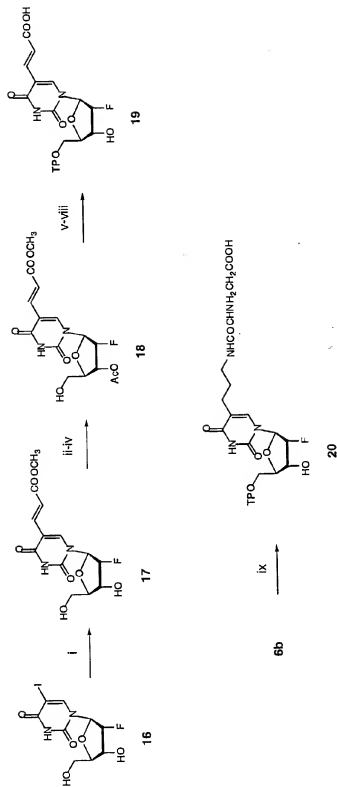


Figure 24: Synthesis of 5-(3-aminoalkyl) and 5-[3(N-succinyl)aminopropyl] functionalized cytidines

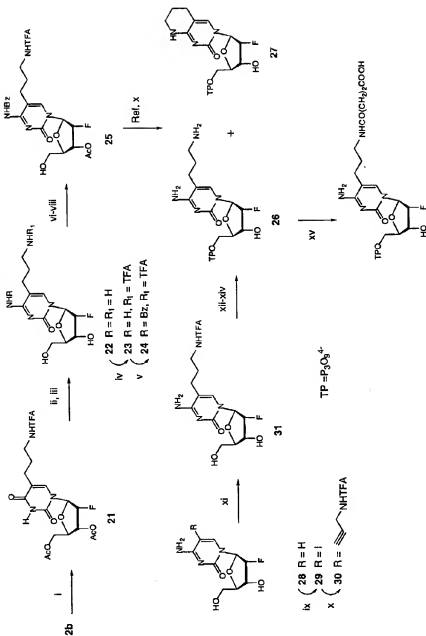


Figure 26: Class I ribozyme Stem truncation and Loop replacement

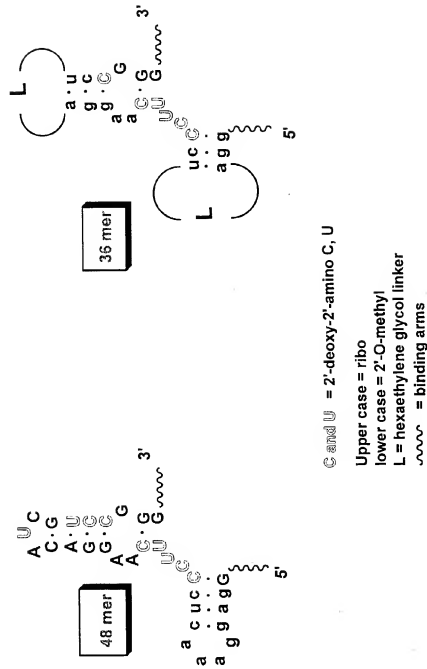
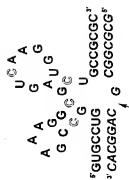


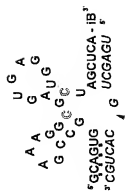
Figure 27: Non ribo Class II (zinczyme) motifs

Figure 27a



Substrate is the Kras site 521

Figure 27b



Substrate is the HER2 site 972

Legend

Red indicates active site residues

A indicates active site residues

A G C U indicates 3'-OH residues

Subscript 1 indicates phosphothioate linkage

IB indicates inverted deoxy thioic residues

Figure 28: Non ribo Class II (zinczyme) cleavage reactions

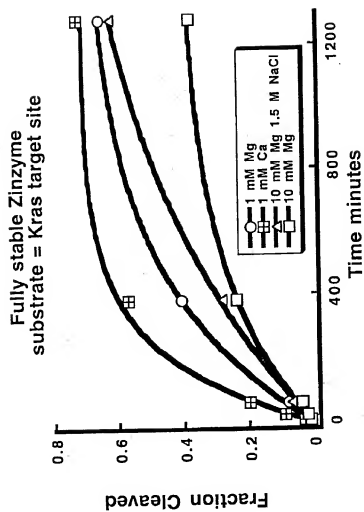


Figure 30: RPI 18656 Mediated Decrease in HER2 RNA
site 972 vs SAC

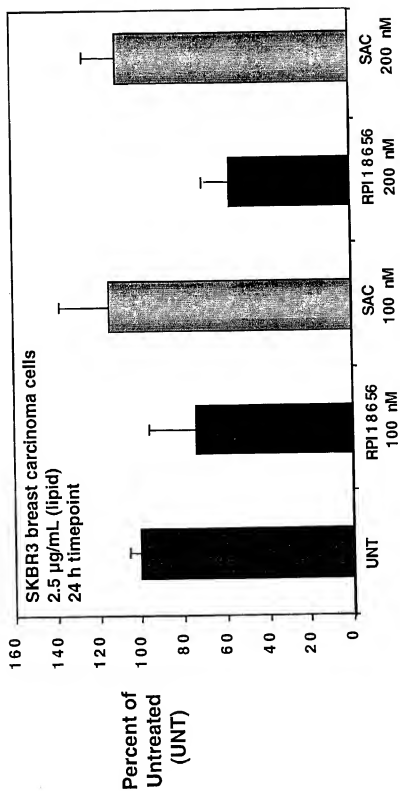


Figure 31: Dose Response of RPI 18656 Against Site 972 in Antiproliferation Assay

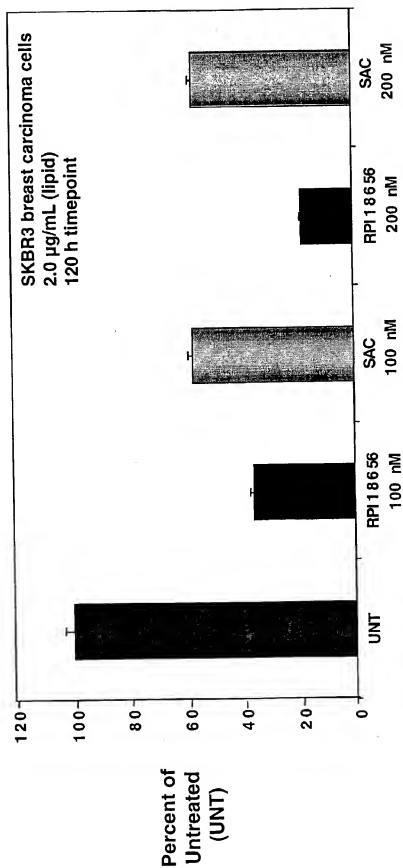


Figure 32: Dose-Dependent HER2 RNA Reduction after
Treatment with RPI 19293

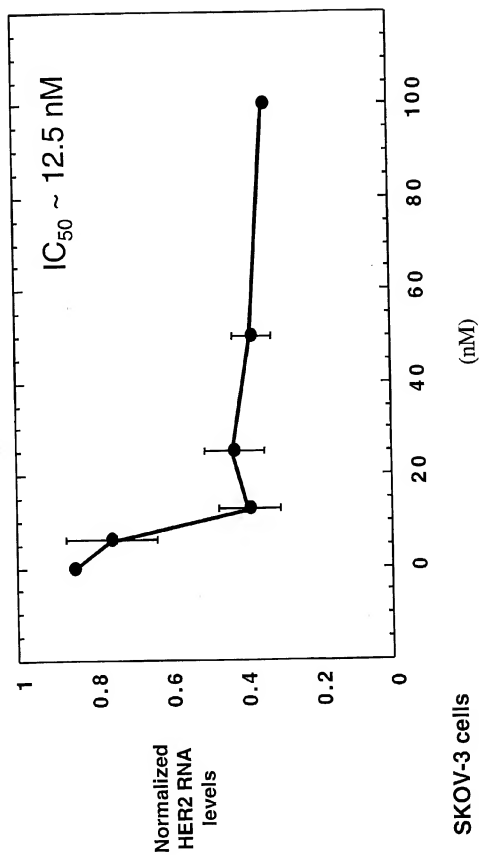


Figure 33: Dose-Dependent HER2 RNA Reduction & Inhibition of Cell Proliferation (RPL19293)

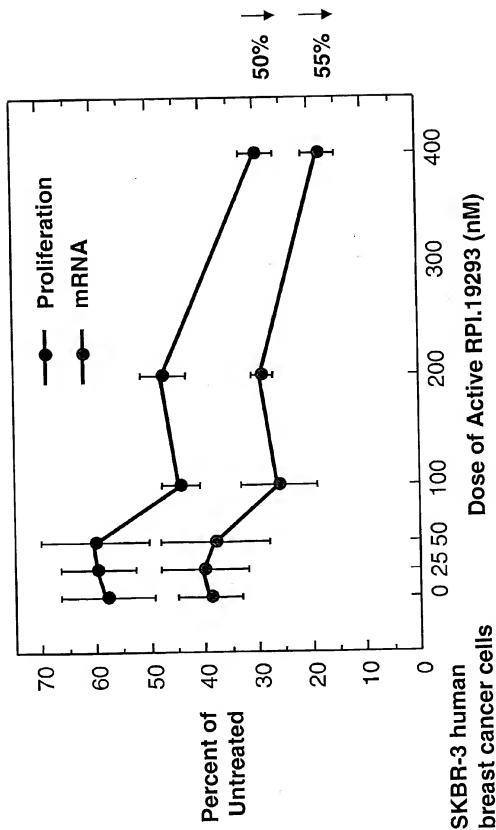
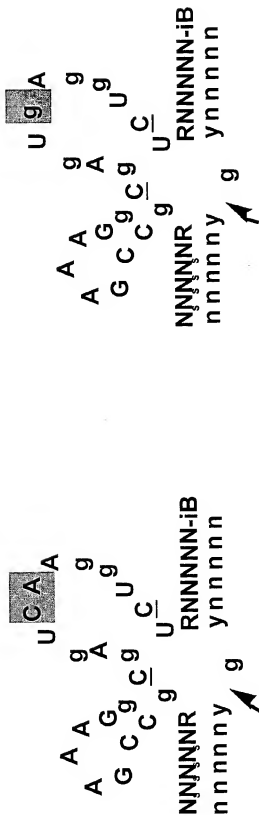


Figure 34: Zinzyme CA →G loop (7-ribo)



Lower case = 2'-OH

Underline = 2'-NH₂

UPPER CASE = 2'-O-Me

N_s = Phosphothioate linkage

Figure 35: Screen of Zinzynes (containing ribose-G reductions) for
Anti-proliferative Activity

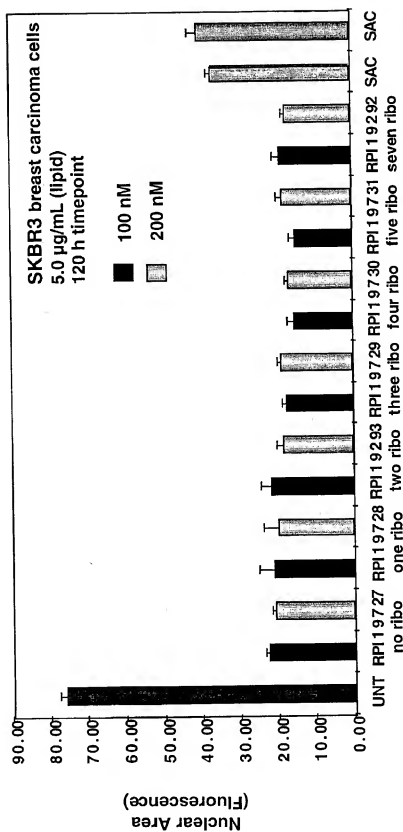
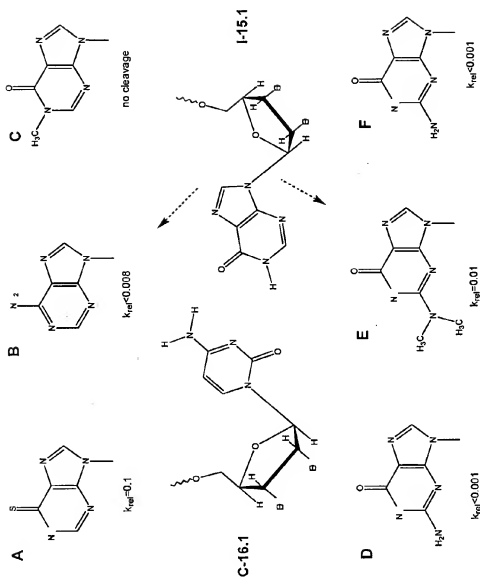
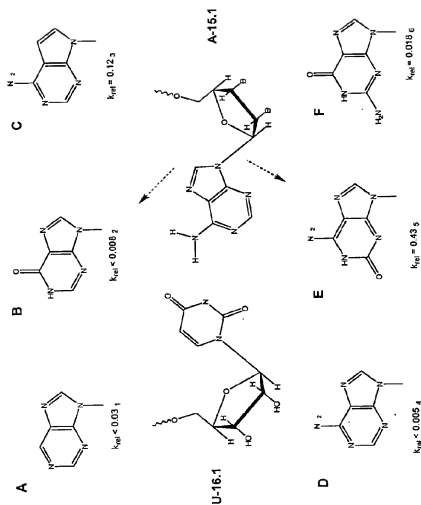


Figure 36: Effect of substitutions at NCH ribozyme position 15.1



k_{rel} values describe the cleavage rate relative to I-15.1 activity

Figure 37: Effect of substitutions at Hammerhead Ribozyme position 15.1



1. Slim and Galt, 1992, *Biochem Biophys Res Commun*, 183, 605-609.
2. Ludwig et al., 1998, *Nucleic Acids Res*, 26, 2279-2285.
3. Seela et al., 1993, *Helvetica Chimica Acta*, 76, 1809-1819.
4. Seela et al., 1998, *Nucleic Acids Res*, 26, 1010-1018.
5. Ng et al., 1994, *Biochemistry*, 33, 12119-26.
6. Bevers et al., 1995, *Biochemistry*, 35, 9403-90.

k_{cat} values describe the cleavage rate relative to A-15.1 activity